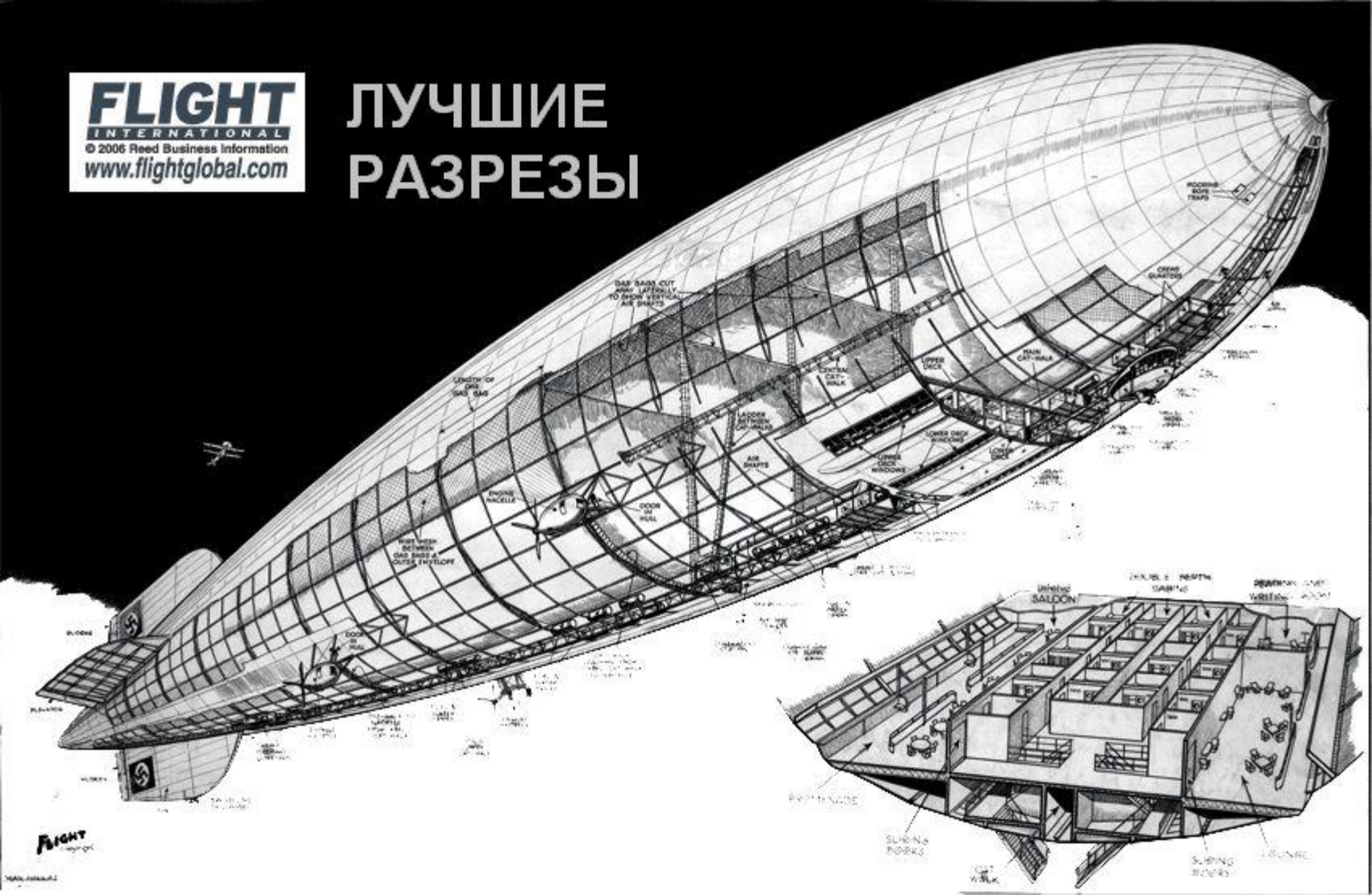
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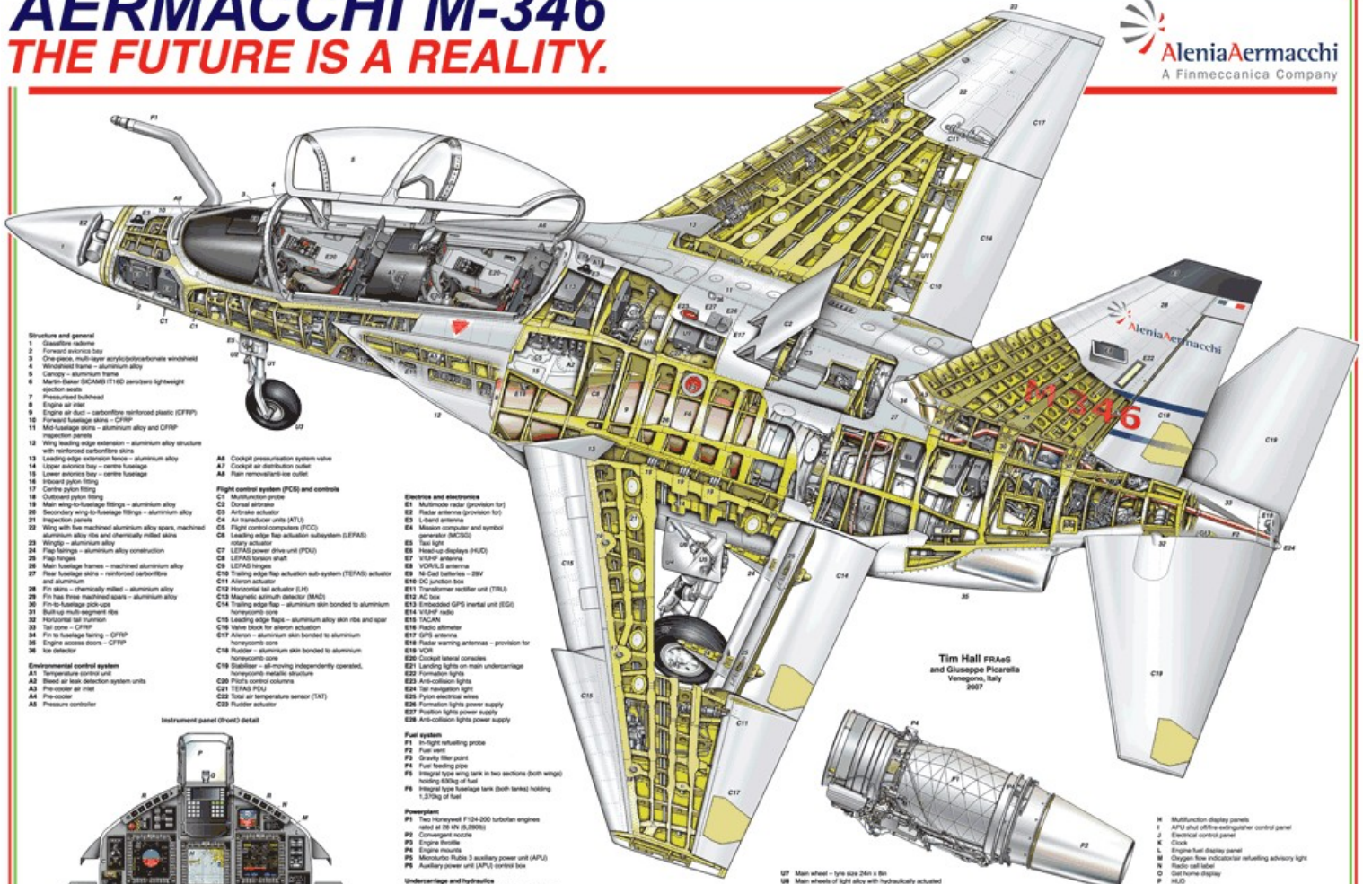
ЛУЧШИЕ РАЗРЕЗЫ



AERMACCHI M-346

THE FUTURE IS A REALITY.

AleniaAermacchi
A Finmeccanica Company



Structure and general
1 Glassfibre radome
2 Forward avionics bay
3 One-piece, multi-layer acrylic/polycarbonate windshield
4 Windshield frame – aluminium alloy
5 Canopy – aluminium frame
6 Martin-Baker SICAMB IT16D zero/zero lightweight ejection seats
7 Pressurised bulkhead
8 Engine air inlet
9 Engine air duct – carbonfibre reinforced plastic (CFRP)
10 Forward fuselage skins – CFRP
11 Mid-fuselage skins – aluminium alloy and CFRP inspection panels
12 Wing leading edge extension – aluminium alloy structure with reinforced carbonfibre skins
13 Leading edge extension fence – aluminium alloy
14 Upper avionics bay – centre fuselage
15 Lower avionics bay – centre fuselage
16 Inboard pylon fitting
17 Centre pylon fitting
18 Outboard pylon fitting
19 Main wing-to-fuselage fittings – aluminium alloy
20 Secondary wing-to-fuselage fittings – aluminium alloy
21 Inspection panels
22 Wing with five machined aluminium alloy spars, machined aluminium alloy ribs and chemically milled skins
23 Winglip – aluminium alloy
24 Flap fairings – aluminium alloy construction
25 Flap hinges
26 Main fuselage frames – machined aluminium alloy
27 Rear fuselage skins – reinforced carbonfibre and aluminium
28 Fin skins – chemically milled – aluminium alloy
29 Fin has three machined spars – aluminium alloy
30 Fin-to-fuselage pick-ups
31 Built-up multi-segment ribs
32 Horizontal tail trunnion
33 Tail cone – CFRP
34 Fin to fuselage fairing – CFRP
35 Engine access doors – CFRP
36 Ice detector

Environmental control system
A1 Temperature control unit
A2 Bleed air leak detection system units
A3 Pre-cooler air inlet
A4 Pre-cooler
A5 Pressure controller
A6 Cockpit pressurisation system valve
A7 Cockpit air distribution outlet
A8 Rain removal/anti-ice outlet

Flight control system (FCS) and controls
C1 Multifunction probe
C2 Dorsal airbrake
C3 Airbrake actuator
C4 Air transducer units (ATU)
C5 Flight control computers (FCC)
C6 Leading edge flap actuation subsystem (LEFAS)
rotary actuator
C7 LEFAS power drive unit (PDU)
C8 LEFAS torsion shaft
C9 LEFAS hinges
C10 Trailing edge flap actuation sub-system (TEFAS) actuator
C11 Aileron actuator
C12 Horizontal tail actuator (LH)
C13 Magnetic azimuth detector (MAD)
C14 Trailing edge flap – aluminium skin bonded to aluminium honeycomb core
C15 Leading edge flaps – aluminium alloy skin ribs and spar
C16 Valve block for aileron actuation
C17 Aileron – aluminium skin bonded to aluminium honeycomb core
C18 Rudder – aluminium skin bonded to aluminium honeycomb core
C19 Stabiliser – all-moving independently operated, honeycomb metallic structure
C20 Pilot's control columns
C21 TEFAS PDU
C22 Total air temperature sensor (TAT)
C23 Rudder actuator

Instrument panel (front) detail

Electrics and electronics
E1 Multimode radar (provision for)
E2 Radar antenna (provision for)
E3 L-band antenna
E4 Mission computer and symbol generator (MCSG)
E5 Taxi light
E6 Head-up displays (HUD)
E7 V/UHF antenna
E8 VOR/ILS antenna
E9 Ni-Cad batteries – 28V
E10 DC junction box
E11 Transformer rectifier unit (TRU)
E12 AC box
E13 Embedded GPS inertial unit (EGI)
E14 V/UHF radio
E15 TACAN
E16 Radio altimeter
E17 GPS antenna
E18 Radar warning antennas – provision for
E19 VOR
E20 Cockpit lateral consoles
E21 Landing lights on main undercarriage
E22 Formation lights
E23 Anti-collision lights
E24 Tail navigation light
E25 Pylon electrical wires
E26 Formation lights power supply
E27 Position lights power supply
E28 Anti-collision lights power supply

Fuel system
F1 In-flight refuelling probe
F2 Fuel vent
F3 Gravity filler point
F4 Fuel feeding pipe
F5 Integral type wing tank in two sections (both wings) holding 630kg of fuel
F6 Integral type fuselage tank (both tanks) holding 1,370kg of fuel

Powerplant
P1 Two Honeywell F124-200 turbofan engines rated at 28 kN (6,280lb)
P2 Convergent nozzle
P3 Engine throttle
P4 Engine mounts
P5 Microturbo Rubis 3 auxiliary power unit (APU)
P6 Auxiliary power unit (APU) control box

Undercarriage and hydraulics
U1 Steerable rearward retracting nose landing gear – hydraulically actuated
U2 Nose wheel door – Nomex honeycomb with carbon fibre skins. There are two forward doors one of which is attached to the nose landing gear and the other to the drag brace actuator (one shown) The other two rear doors are actuated hydraulically. These close after extension
U3 Nose wheel – tyre size 18in x 5.5in
U4 Main landing gear doors – Nomex honeycomb with carbonfibre skins. Two doors each side. The forward doors closing after extension. The forward door is hydraulically actuated with the rear door being attached to the main landing gear
U5 Main landing gear – hydraulically actuated
U6 Retraction/extension actuator
U7 Main wheel – tyre size 24in x 8in
U8 Main wheels of light alloy with hydraulically actuated carbon brakes
U9 Brake control unit
U10 One-shot reservoirs – hydraulic emergency power unit
U11 Hydraulic piping for aileron actuator

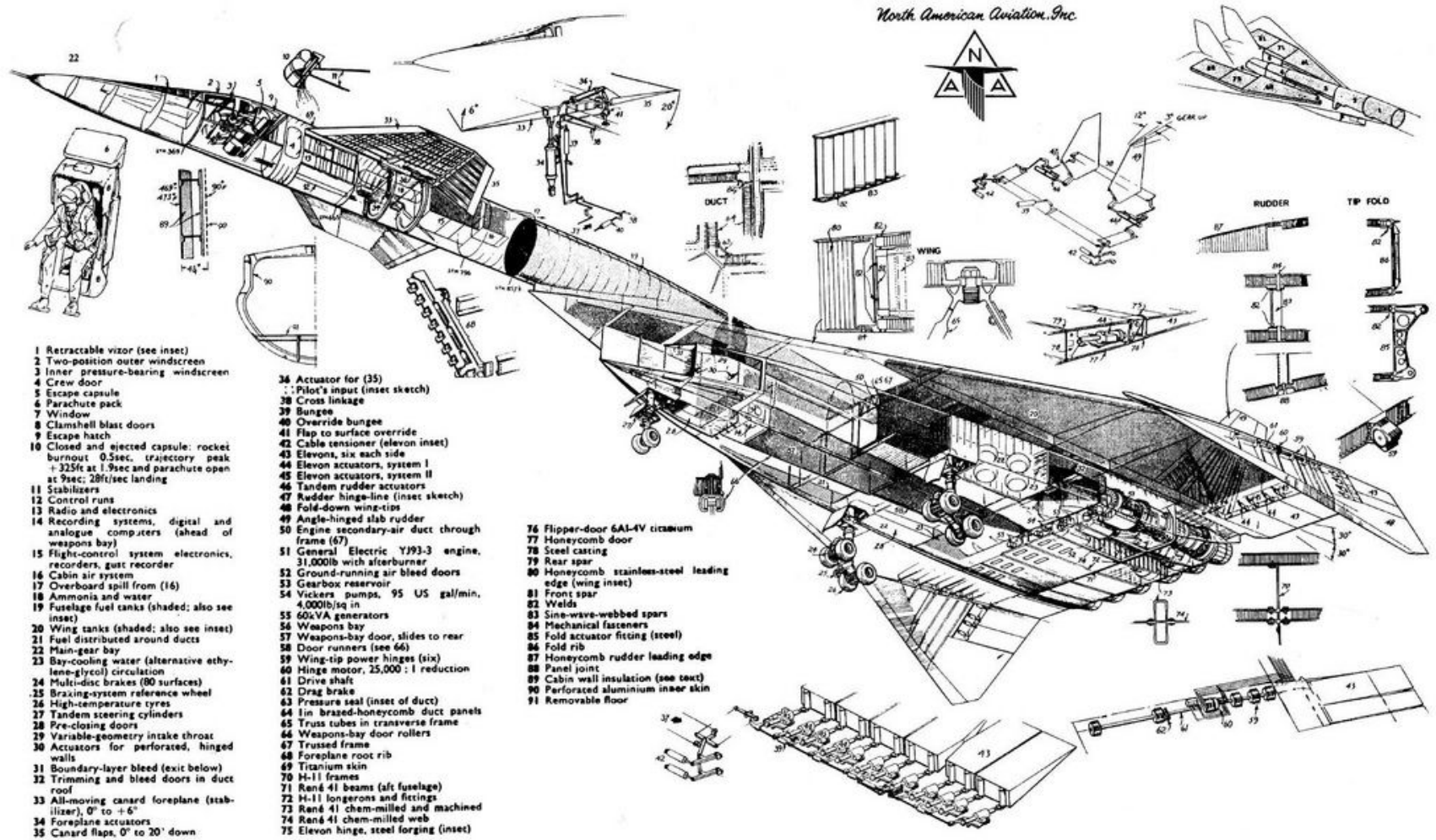
Instrument panel – front
A FCS/status control panel
B Late arm control panel/salvo jettison button
C Control surface display
D Landing gear lever
E Fuel shut off/fire extinguisher control panel for left/hand and right/hand engines
F Park and emergency brake
G Landing and taxi light
H Multifunction display panels
I APU shut off/fire extinguisher control panel
J Electrical control panel
K Clock
L Engine fuel display panel
M Oxygen flow indicator/air refuelling advisory light
N Radio call label
O Get home display
P HUD
Q Video camera
R Up-front control panel
S Warning panel

Tim Hall FRAeS
and Giuseppe Picarella
Venegono, Italy
2007

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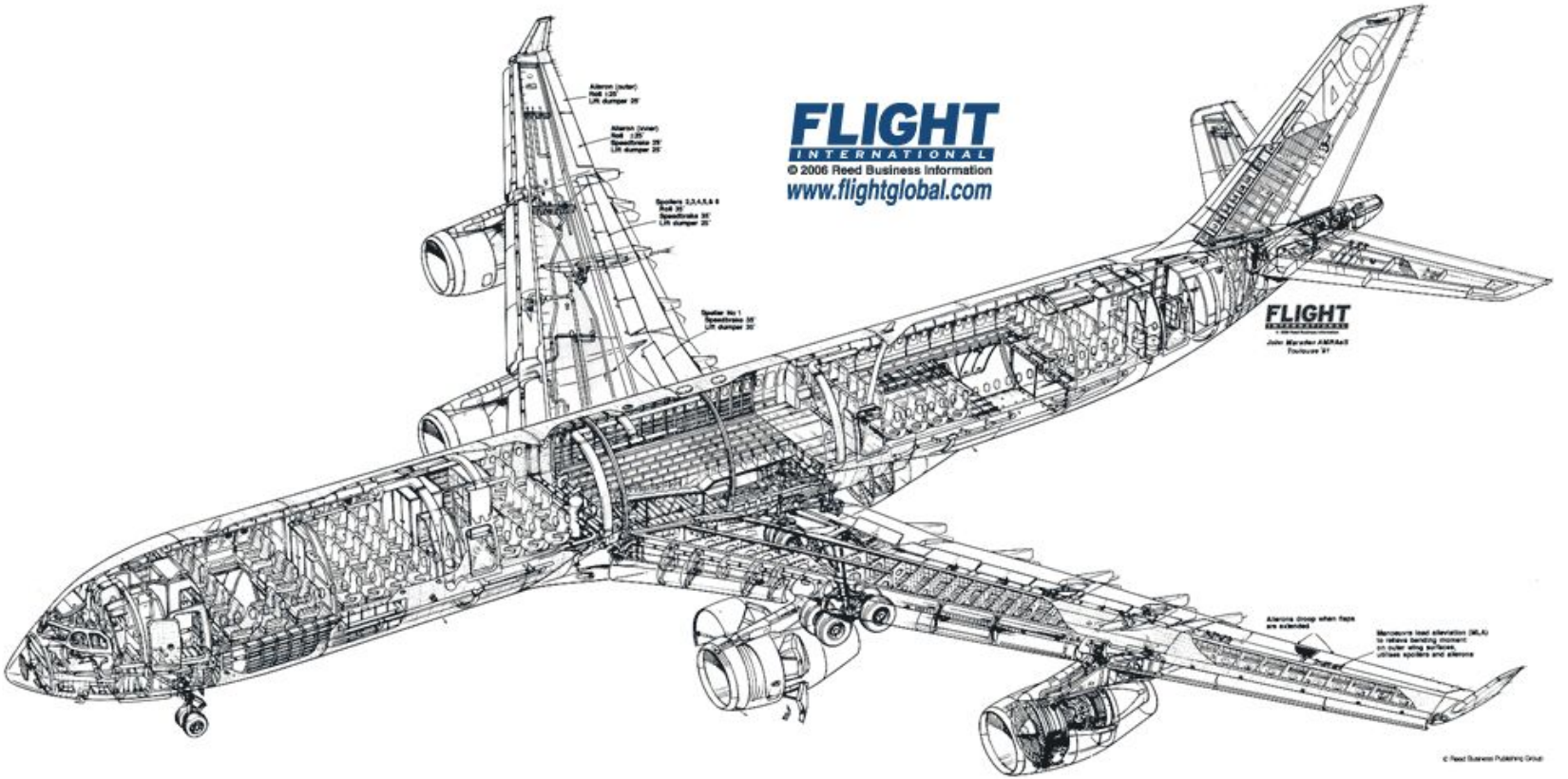
North American Aviation, Inc



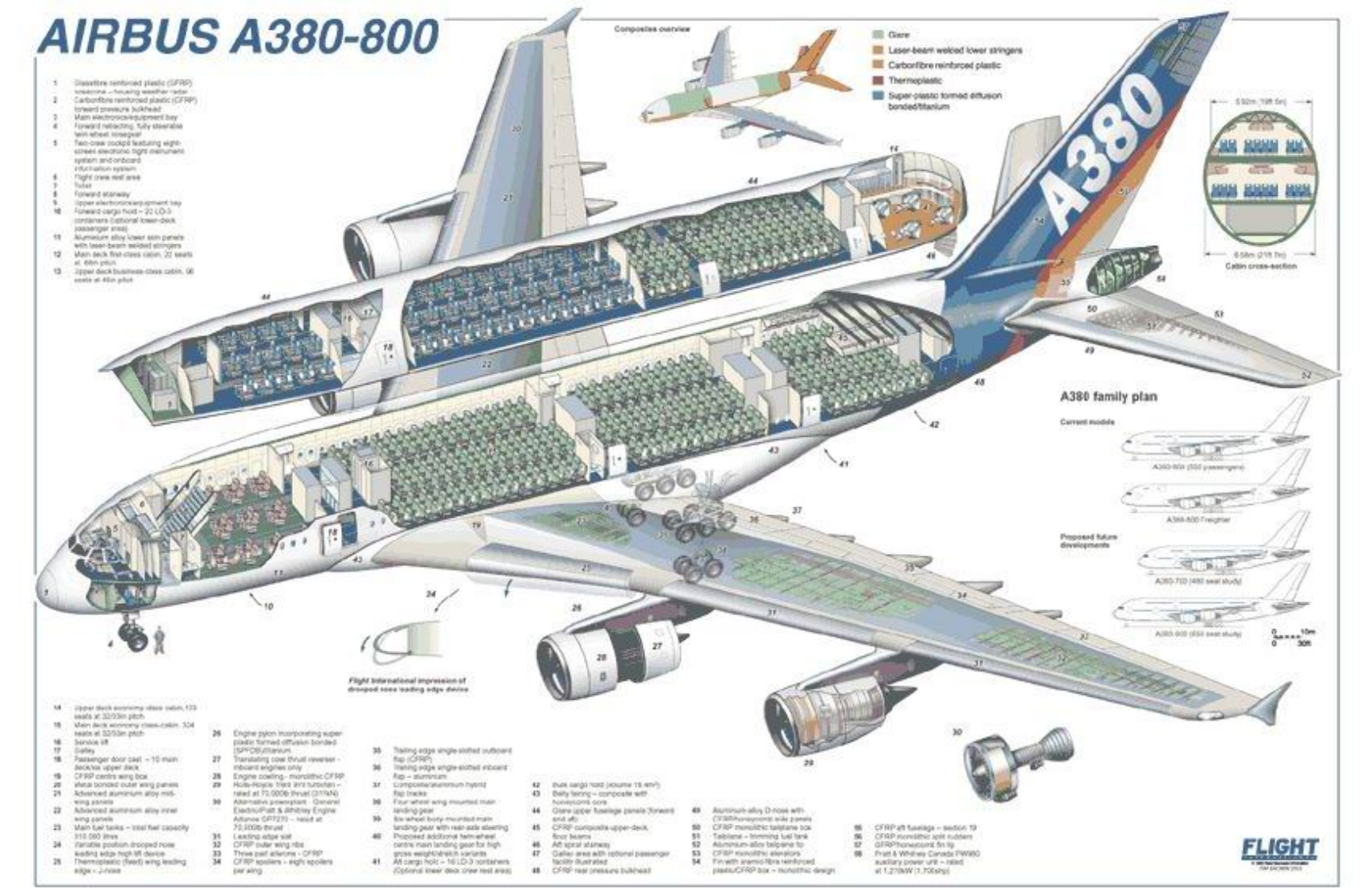
1 Retractable vizor (see inset)
2 Two-position outer windscreen
3 Inner pressure-bearing windscreen
4 Crew door
5 Escape capsule
6 Parachute pack
7 Window
8 Clamshell blast doors
9 Escape hatch
10 Closed and ejected capsule: rocket burnout 0.5sec, trajectory peak +325ft at 1.9sec and parachute open at 9sec; 28ft/sec landing
11 Stabilizers
12 Control runs
13 Radio and electronics
14 Recording systems, digital and analogue computers (ahead of weapons bay)
15 Flight-control system electronics, recorders, gust recorder
16 Cabin air system
17 Overboard spill from (16)
18 Ammonia and water
19 Fuselage fuel tanks (shaded; also see inset)
20 Wing tanks (shaded; also see inset)
21 Fuel distributed around ducts
22 Main-gear bay
23 Bay-cooling water (alternative ethylene-glycol) circulation
24 Multi-disc brakes (80 surfaces)
25 Braking-system reference wheel
26 High-temperature tyres
27 Tandem steering cylinders
28 Pre-closing doors
29 Variable-geometry intake throat
30 Actuators for perforated, hinged walls
31 Boundary-layer bleed (exit below)
32 Trimming and bleed doors in duct roof
33 All-moving canard foreplane (stabilizer), 0° to +6°
34 Foreplane actuators
35 Canard flaps, 0° to 20° down

34 Actuator for (35)
∴ Pilot's input (inset sketch)
38 Cross linkage
39 Bungee
40 Override bungee
41 Flap to surface override
42 Cable tensioner (elevon inset)
43 Elevons, six each side
44 Elevon actuators, system I
45 Elevon actuators, system II
46 Tandem rudder actuators
47 Rudder hinge-line (inset sketch)
48 Fold-down wing-tips
49 Angle-hinged slab rudder
50 Engine secondary-air duct through frame (67)
51 General Electric YJ93-3 engine, 31,000lb with afterburner
52 Ground-running air bleed doors
53 Gearbox reservoir
54 Vickers pumps, 95 US gal/min, 4,000lb/sq in
55 60kVA generators
56 Weapons bay
57 Weapons-bay door, slides to rear
58 Door runners (see 66)
59 Wing-tip power hinges (six)
60 Hinge motor, 25,000 : 1 reduction
61 Drive shaft
62 Drag brake
63 Pressure seal (inset of duct)
64 1in brazed-honeycomb duct panels
65 Truss tubes in transverse frame
66 Weapons-bay door rollers
67 Trussed frame
68 Foreplane root rib
69 Titanium skin
70 H-11 frames
71 René 41 beams (aft fuselage)
72 H-11 longerons and fittings
73 René 41 chem-milled and machined
74 René 41 chem-milled web
75 Elevon hinge, steel forging (inset)

76 Flipper-door 6Al-4V titanium
77 Honeycomb door
78 Steel casting
79 Rear spar
80 Honeycomb stainless-steel leading edge (wing inset)
81 Front spar
82 Welds
83 Sine-wave-webbed spars
84 Mechanical fasteners
85 Fold actuator fitting (steel)
86 Fold rib
87 Honeycomb rudder leading edge
88 Panel joint
89 Cabin wall insulation (see text)
90 Perforated aluminium inner skin
91 Removable floor

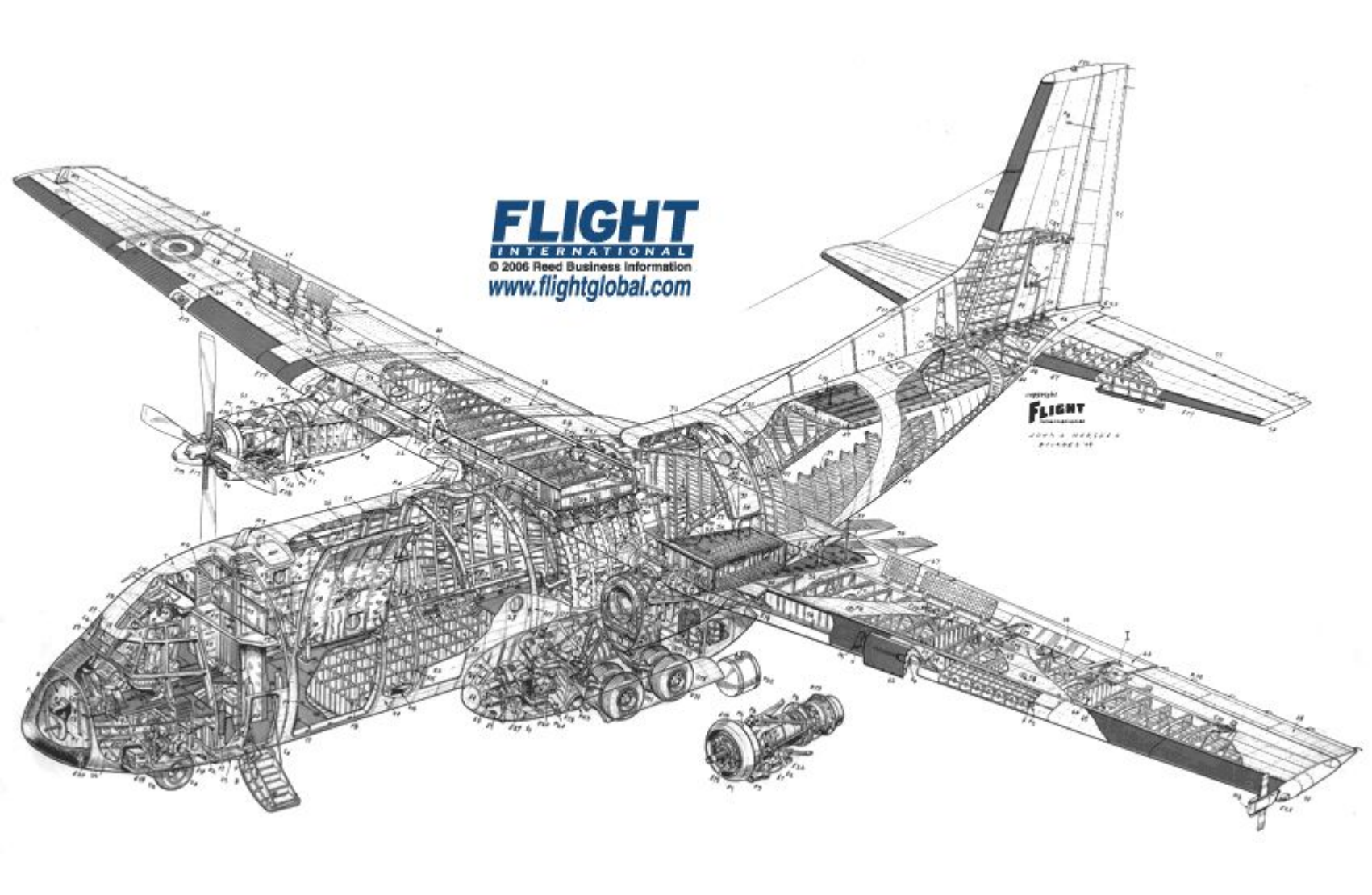

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Aileron droop when flaps are extended
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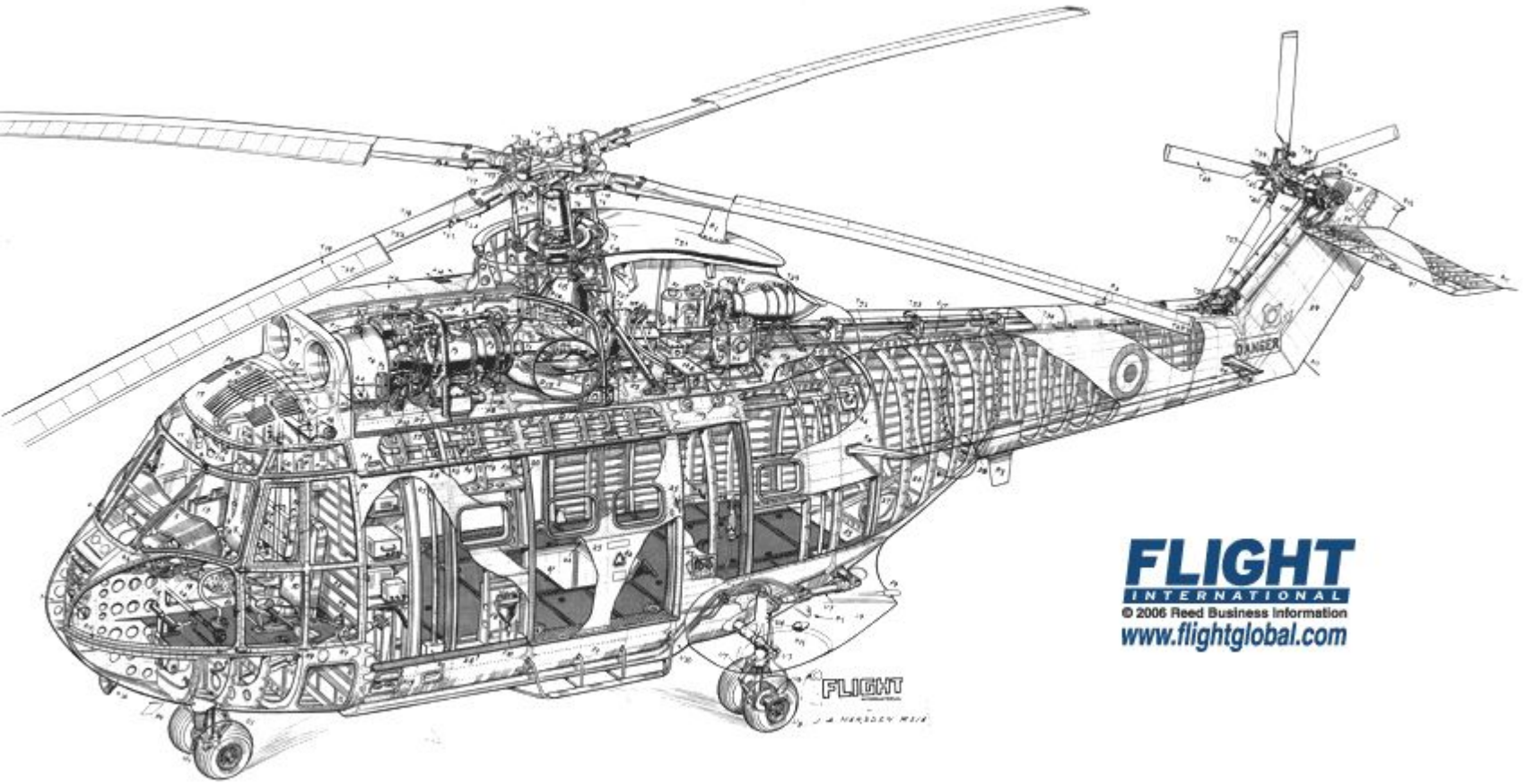
AIRBUS A380-800



1 Glassfibre reinforced plastic (GFRP) radome – housing weather radar
2 Carbonfibre reinforced plastic (CFRP) forward pressure bulkhead
3 Main electronics/equipment bay
4 Forward retracting, fully steerable twin-wheel nosegear
5 Two-crew cockpit featuring eight-screen electronic flight instrument system and onboard information system
6 Flight crew seat area
7 Toilet
8 Forward stairway
9 Upper electronics/equipment bay
10 Forward cargo hold – 22 LD-3 containers (optional lower-deck passenger area)
11 Aluminium alloy lower skin panels with laser-beam welded stringers
12 Main deck first-class cabin, 22 seats at 68in pitch
13 Upper deck business-class cabin, 96 seats at 46in pitch
14 Upper deck economy class cabin,103 seats at 32/33in pitch
15 Main deck economy class cabin, 324 seats at 32/33in pitch
16 Service lift
17 Galley
18 Passenger door/ cast – 10 main deck/six upper deck
19 CFRP centre wing box
20 Metal bonded outer wing panels
21 Advanced aluminium alloy mid-wing panels
22 Advanced aluminium alloy inner wing panels
23 Main fuel tanks – total fuel capacity 310 000 litres
24 Variable position drooped nose leading edge high lift device
25 Thermoplastic (fixed) wing leading edge – J-nose
26 Engine pylon incorporating super plastic formed diffusion bonded (SPF/DB)titanium
27 Translating cowl thrust reverser - inboard engines only
28 Engine cowling - monolithic CFRP
29 Rolls-Royce Trent xrs turbofan – rated at 72,000lb thrust (321kN)
30 Alternative powerplant - General Electric/Pratt & Whitney Engine Alliance GP7270 – rated at 70,000lb thrust
31 Leading edge slat
32 CFRP outer wing ribs
33 Three part ailerons - CFRP
34 CFRP spoilers - eight spoilers per wing
35 Trailing edge single-slotted outboard flap (CFRP)
36 Trailing edge single-slotted inboard flap – aluminium
37 Composite/aluminium hybrid flap tracks
38 Four-wheel wing mounted main landing gear
39 Six-wheel body-mounted main landing gear with rear-axle steering
40 Proposed additional twin-wheel centre main landing gear for high gross weight/stretch variants
41 Aft cargo hold – 16 LD-3 containers (Optional lower deck crew rest area)
42 Bulk cargo hold (volume 15.4m³)
43 Belly fairing – composite with honeycomb core
44 Glare upper fuselage panels (forward and aft)
45 CFRP composite upper-deck floor beams
46 Aft spiral stairway
47 Galley area with optional passenger facility illustrated
48 CFRP rear pressure bulkhead
49 Aluminium alloy D-nose with CFRP/honeycomb side panels
50 CFRP monolithic tailplane box
51 Tailplane – trimming fuel tank
52 Aluminium-alloy tailplane fin
53 CFRP monolithic elevators
54 Fin with aramid-fibre reinforced plastic/CFRP box – monolithic design
55 CFRP aft fuselage – section 19
56 CFRP monolithic split rudders
57 GFRP/honeycomb fin tip
58 Pratt & Whitney Canada PW980 auxiliary power unit – rated at 1,270kW (1,700shp)

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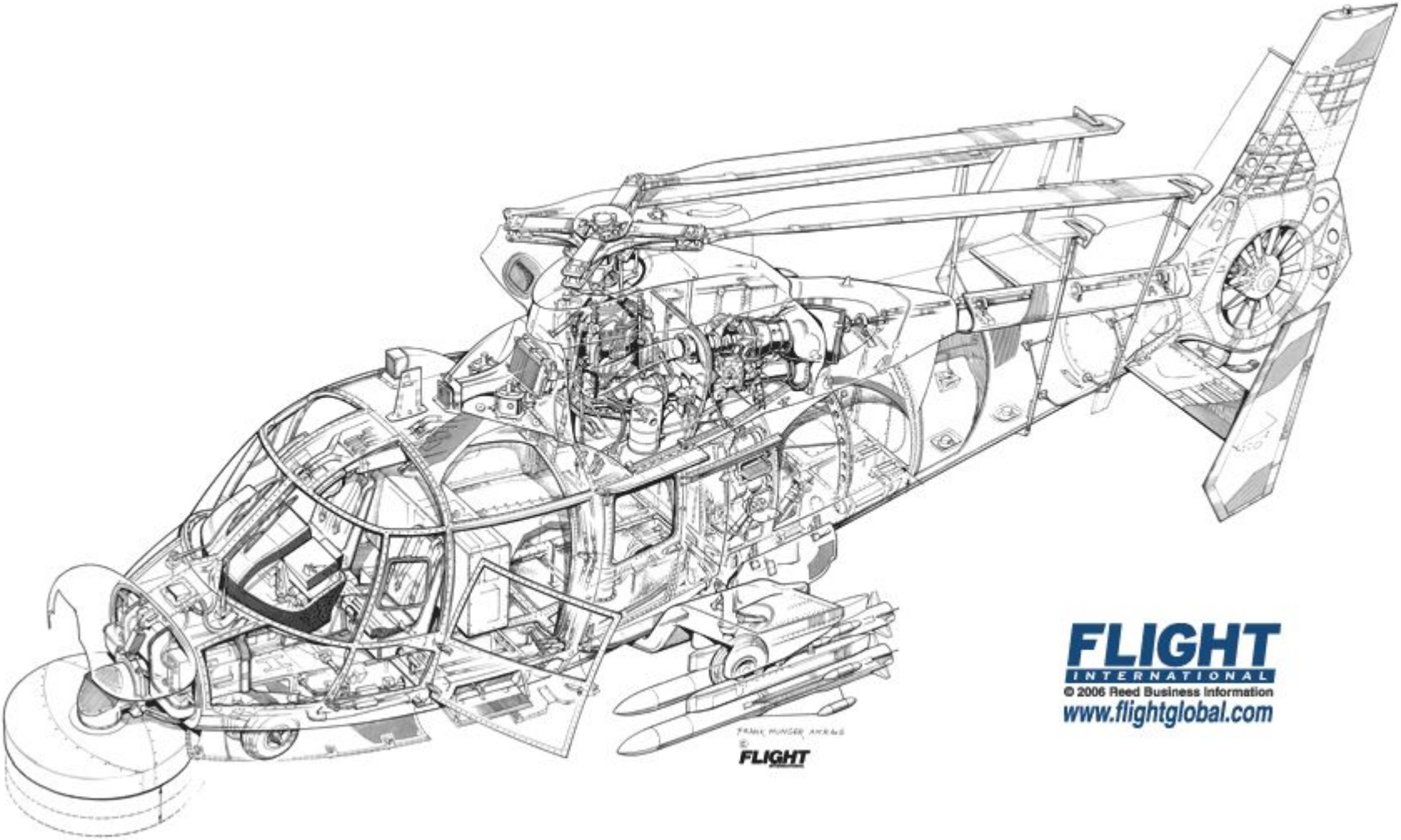

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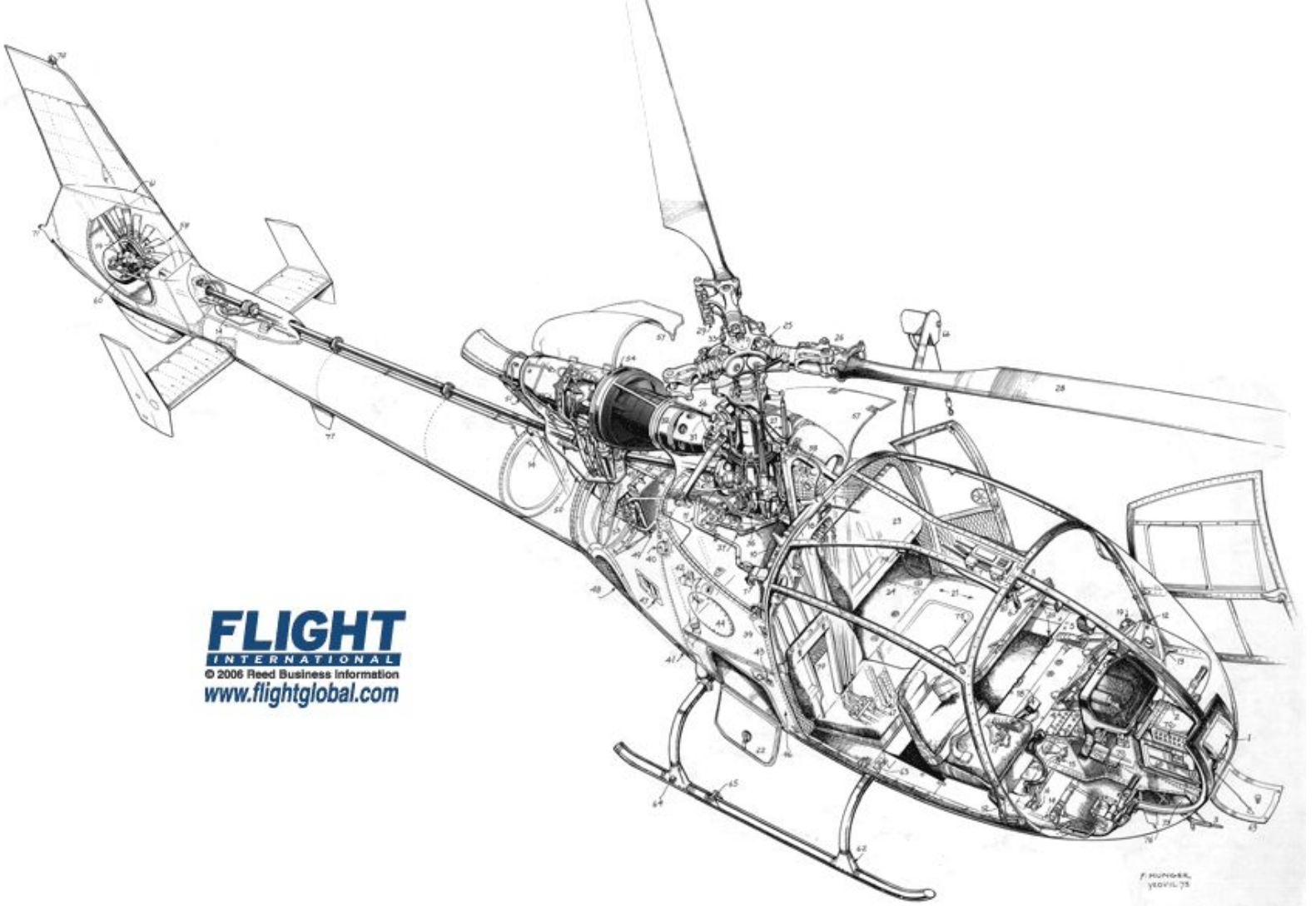
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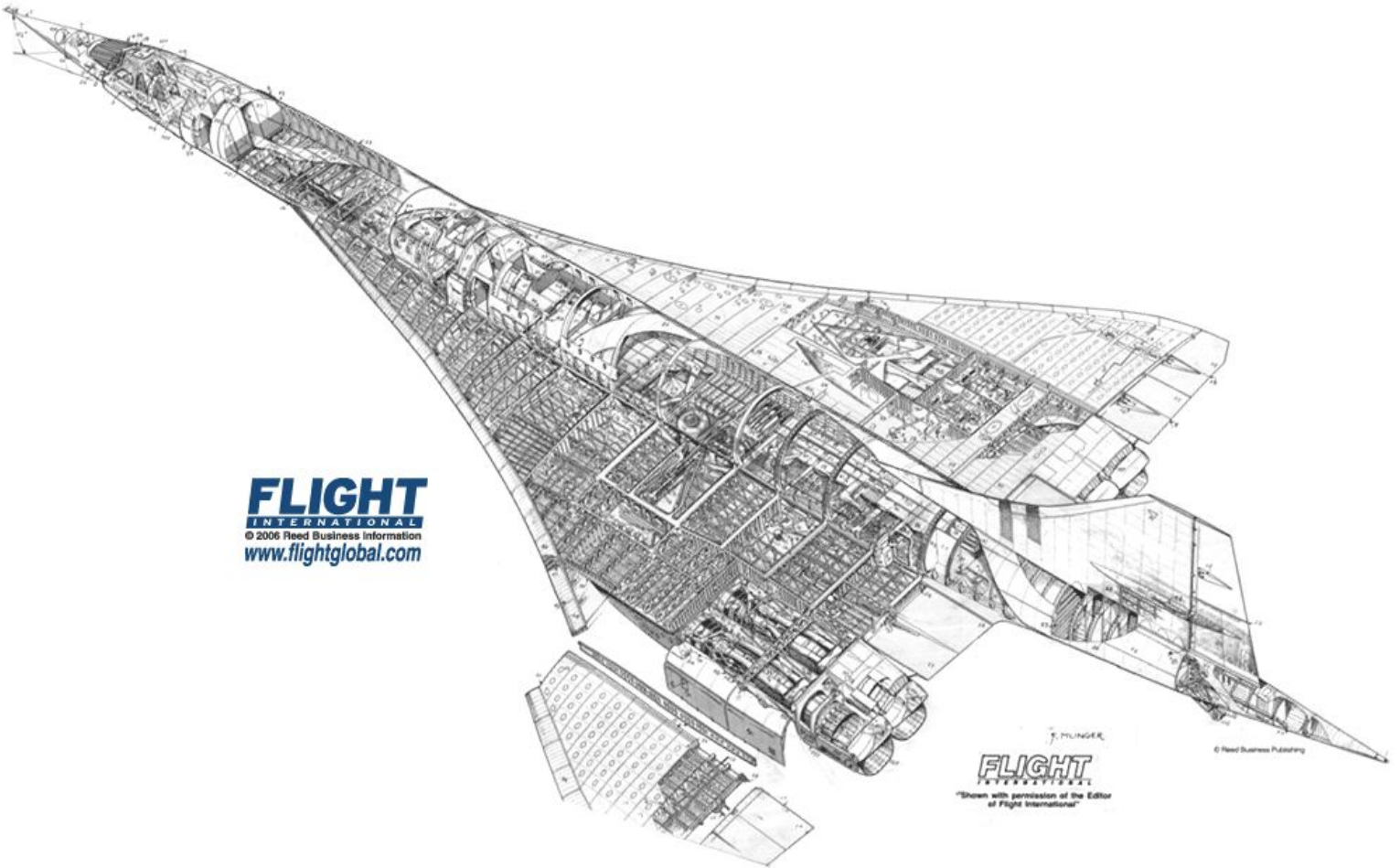
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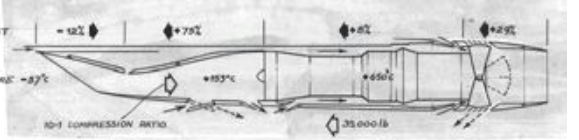
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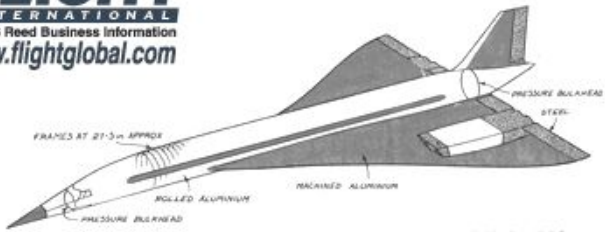


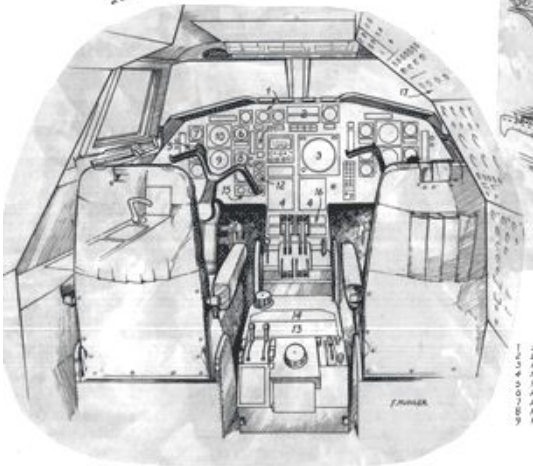
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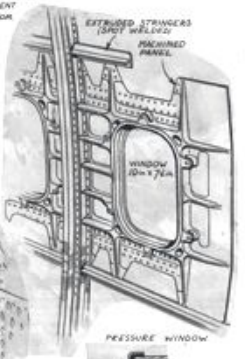

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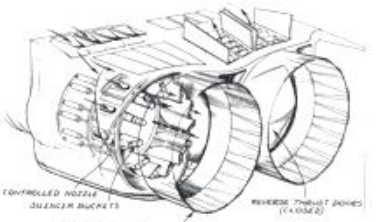


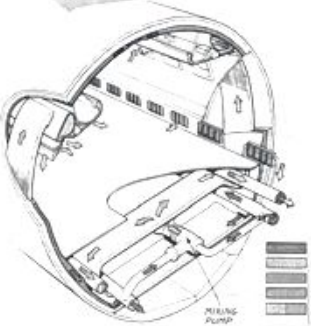




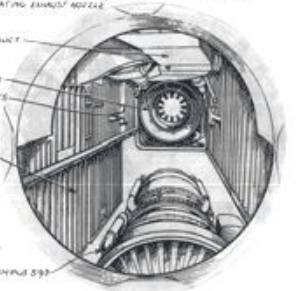


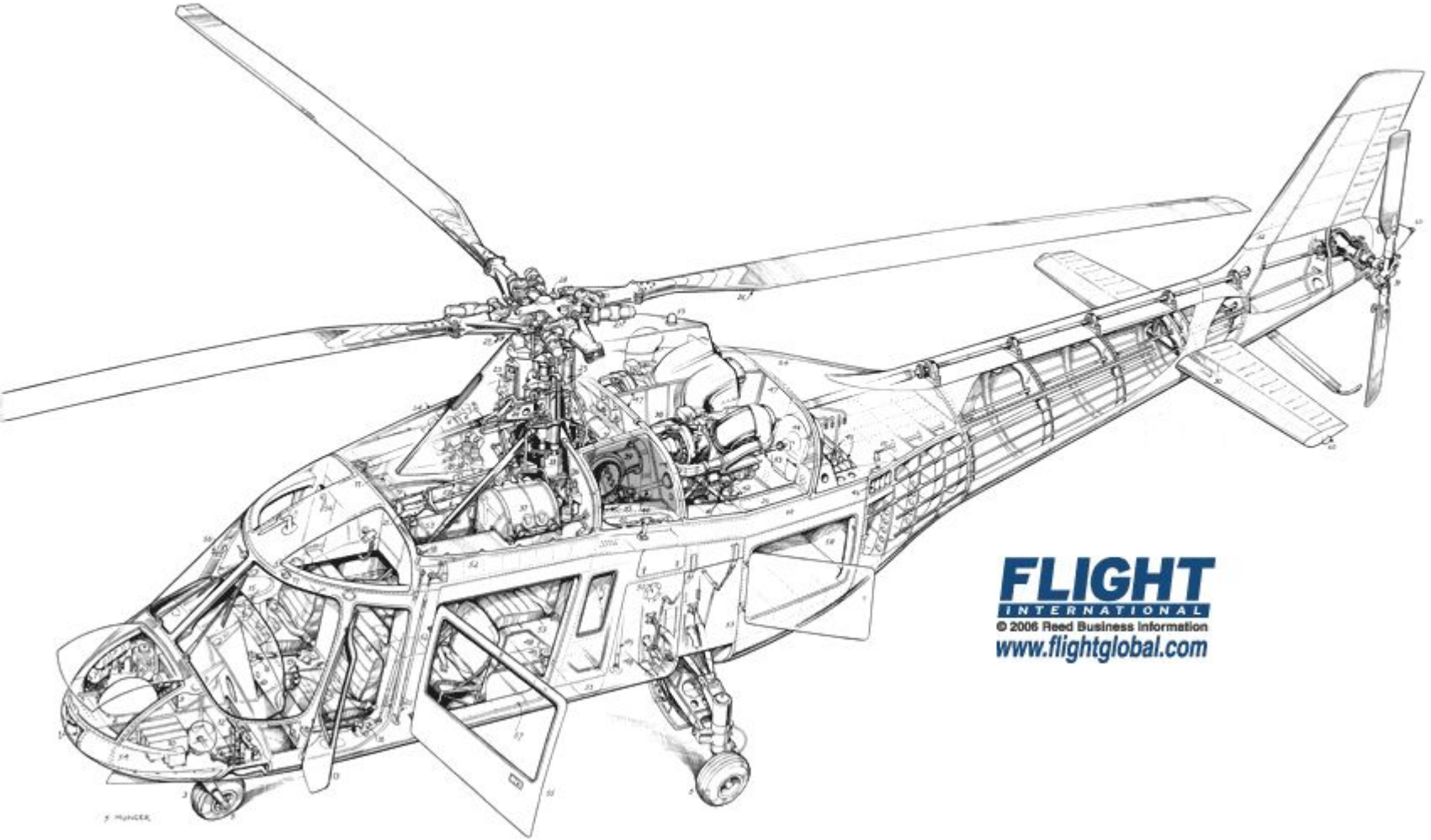
1 STANDBY FLIGHT INST
2 ENGINE INST
3 RADAR
4 NAVIGATION AID PANEL
5 MACHMETER
6 ALTIMETER
7 ASI
8 RADIO COMPASS
9 ROUTE INDICATOR
10 ATTITUDE IND
11 TRIM AND C/G IND
12 LONGITUDINAL ACCELERATION
13 AUTOPILOT
14 AUTO-THROTTLE
15 CABIN AIR
16 RADIO
17 ENGINEERS PANEL



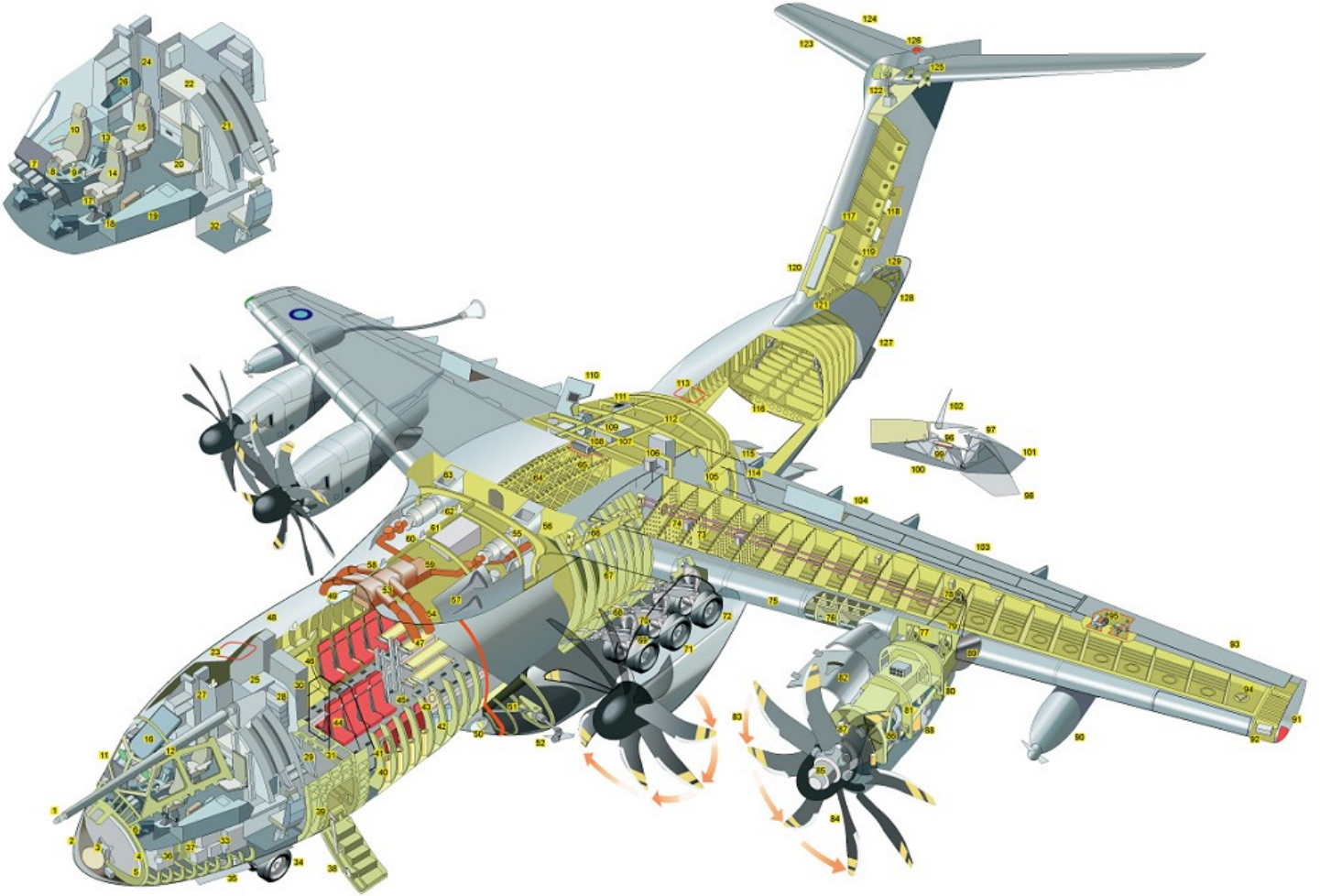


FRESH AIR
VENTILATING AIR
RECIRCULATING AIR
DISCHARGE AIR
DISCHARGE AIR FOR RE-USE

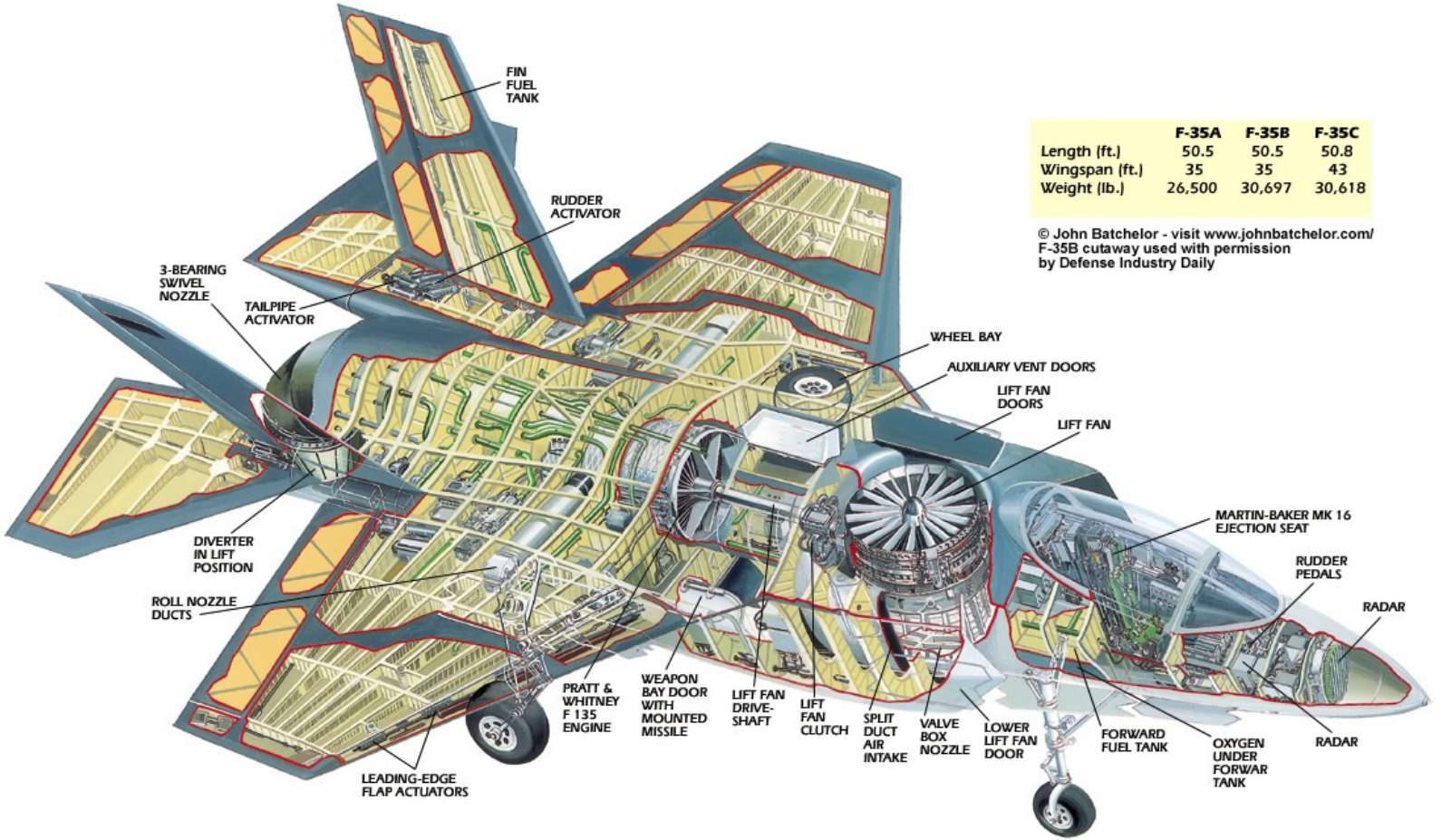




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	F-35A	F-35B	F-35C
Length (ft.)	50.5	50.5	50.8
Wingspan (ft.)	35	35	43
Weight (lb.)	26,500	30,697	30,618

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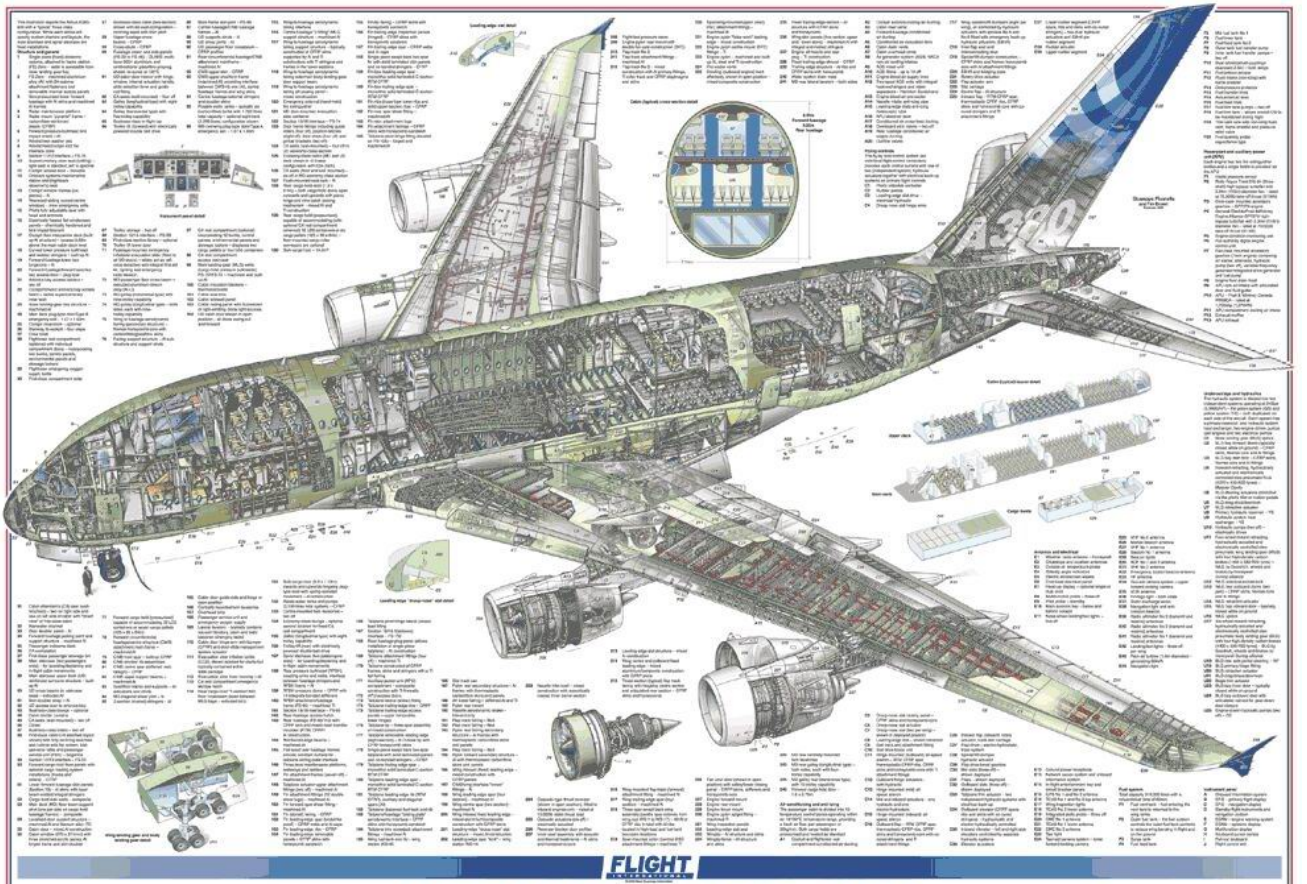


1. Gripen 39C Cockpit
2. Pitot tube
3. Vortex generating strakes
4. Glass-fibre radome
5. ADF antenna
6. Ericsson PS-05 multi-mode radar
7. Cockpit front pressure bulkhead
8. Yaw vane (Under forward fuselage and out of view)
9. Lower UHF antenna (Under forward fuselage and out of view)
10. Incidence vane
11. Formation lighting strip
12. Rudder pedals
13. Windscreen
14. Wide angle head-up-display (HUD)
15. Cockpit canopy, hinged to port
16. Canopy breaker miniature detonating cord (MDC)
17. Starboard air intake
18. Martin-Baker Mk10L zero-zero ejection seat
19. Cockpit rear pressure bulkhead
20. Engine throttle lever
21. Port Side console panel
22. Cockpit section composite skin panelling
23. Nose wheel door with integral taxying light
24. Retraction actuator
25. Twin-wheel nose undercarriage
26. Hydraulic steering jacks
27. 27mm Cannon
28. Port air intake
29. Boundary layer splitter plate
30. Air conditioning system heat exchanger intake duct
31. Avionics equipment compartment, access via nose wheel bay
32. Retractable, telescopic flight refuelling probe
33. Cockpit rear avionics shelf
34. Starboard canard foreplane
35. GPS Antenna
36. Fuselage strake, port and starboard
37. Heat exchanger and exhaust ducts
38. Environmental control system equipment for cabin pressurisation and equipment cooling
39. Self sealing fuel tank between intake ducts
40. Canard foreplane hydraulic actuator
41. Refuelling probe hinged door
42. Foreplane hinge mounting trunion
43. Port intake ducting
44. Temperature probe
45. Port Navigation light
46. Cannon ammunition door
47. Circuit breaker access panel
48. Formation lighting strips
49. Port canard foreplane carbon-fibre composite structure
50. Centre-fuselage aluminium alloy frame structure
51. Aluminium alloy skin panelling
52. Dorsal VHF antenna
53. Optional TACAN antenna
54. Dorsal spine fairing
55. Central fuselage integral fuel tank
56. Port hydraulic reservoir, dual system
57. Wing attachment fuselage main frames
58. Engine compressor intake
59. IFF antenna
60. Wing attachment carbon-fibre composite cover panel
61. Starboard wing integral fuel tank
62. Fuel system piping
63. Leading edge dog-tooth
64. Starboard leading edge two-segment manoeuvring flap
65. Wing tip launcher and RWR antennas
66. Starboard rear position light
67. Starboard outboard elevon
68. Starboard inboard elevon
69. Overwing elevon actuator housing
70. Bleed air spill duct
71. Formation lighting strips
72. Automatic flight control system equipment
73. Fin root attachment joints
74. Rudder hydraulic actuator
75. Carbon-fibre skin panelling with honeycomb substrate
76. Flight control system dynamic pressure sensor
77. Radar warning antenna
78. Fincap UHF/VHF antenna
79. ILS antenna
80. Strobe light / anti collision beacon
81. Carbon-fibre composite rudder
82. Variable area afterburner nozzle
83. Nozzle control actuator (3)
84. Port airbrake panel, closed
85. Airbrake hydraulic jack
86. Afterburner ducting
87. VolvoAero Corp RM12 afterburning turbofan engine
88. Auxiliary power unit (APU)
89. Ventral airframe-mounted accessory equipment gearbox
90. Titanium wing root attachment fittings
91. Port wing integral fuel tank
92. Multi-spar wing panel primary structure
93. Inboard elevon hydraulic actuator
94. Port inboard elevon
95. Elevon carbon-fibre skin panelling with honeycomb substrate
96. Port outboard elevon
97. Rear quadrant radar warning antenna
98. Wing tip missile launch rail
99. Port forward quadrant radar warning antenna
100. Leading edge manoeuvring flap, outboard segment
101. Wing panel carbon-fibre skin panelling
102. Port wing outboard NATO store compatible pylon
103. Starboard wing outboard NATO store compatible pylon
104. Port mainwheel
105. Leading edge manoeuvring flap, inboard segment
106. Leading edge flap-powered hinge actuator
107. Landing light
108. Main undercarriage leg strut
109. Hydraulic retraction jack
110. Leading edge operating torque shaft from central drive motor
111. Mainwheel leg drag/breaker strut
112. Fixed inboard leading edge segment
113. Mainwheel door, closed after cycling of undercarriage
114. Port wing inboard "wet" NATO store compatible pylon
115. Starboard wing inboard "wet" NATO store compatible pylon
116. For Weapons and Stores Capability, see details overleaf

Original artist:
S. Nilsson

Computer artist:
Per Gustavsson

GRIPEN



FLIGHT INTERNATIONAL

AIRBUS A380-800

Rockwell Collins

CRANE AEROSPACE & ELECTRONICS

Pratt & Whitney Canada

Messier-Dowty SAFRAN Group

GOODRICH

Hamilton Sundstrand

BE AEROSPACE

Alenia AERONAUTICA

A Finmeccanica Company

THALES

CAE

ALCOA

Honeywell

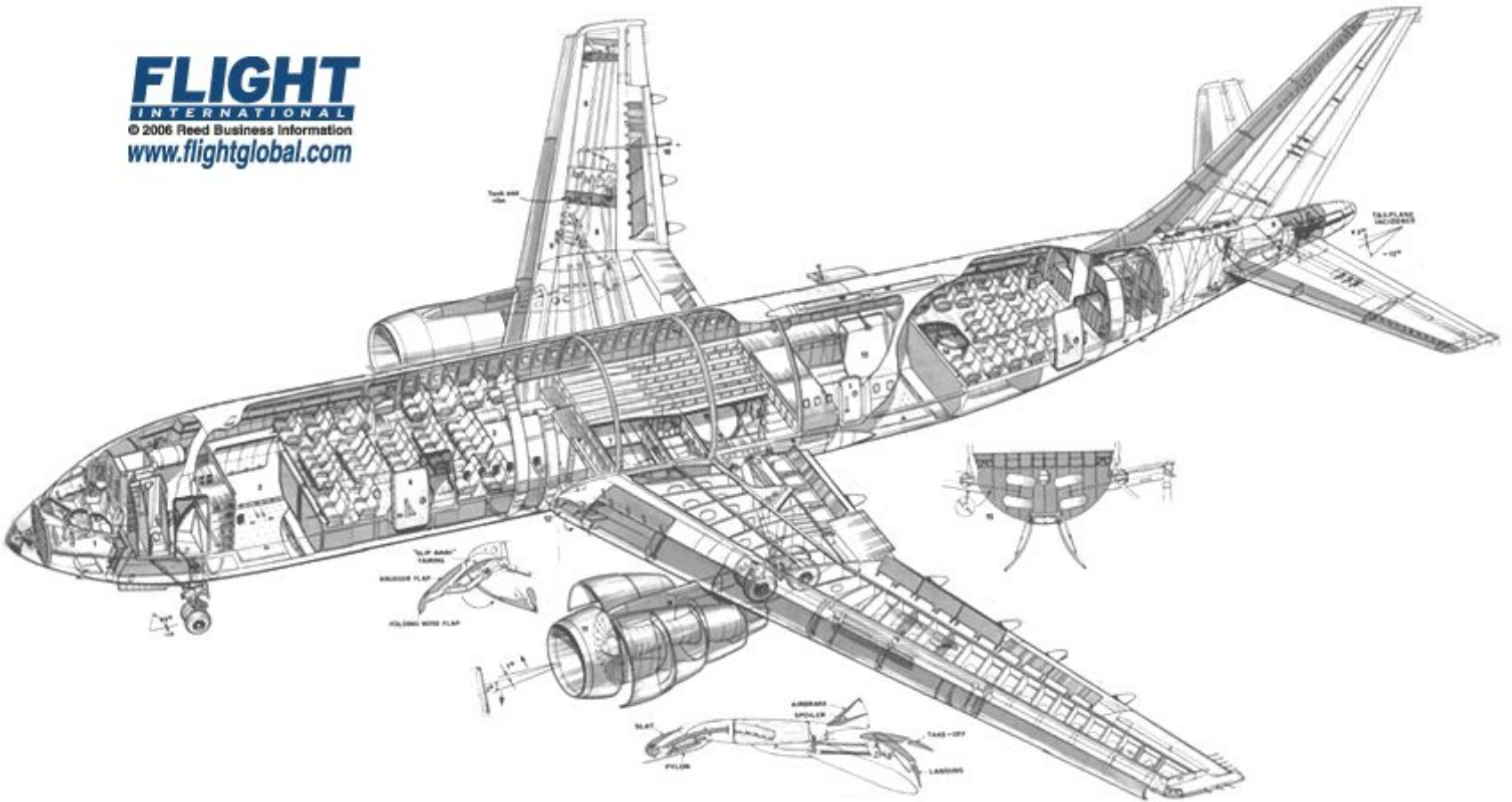
Engine Alliance

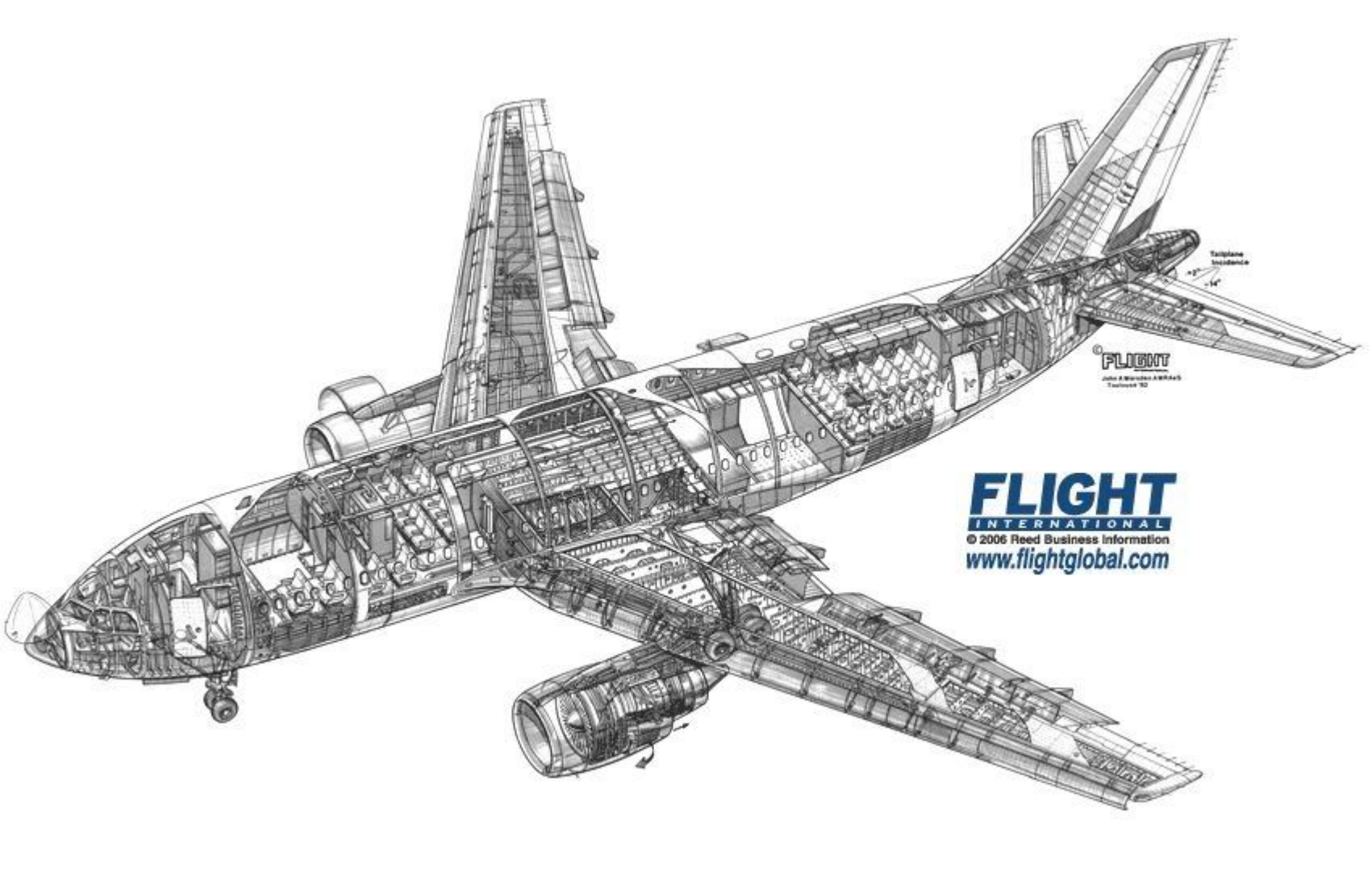
Maintaining A380 right from the start

ZODIAC

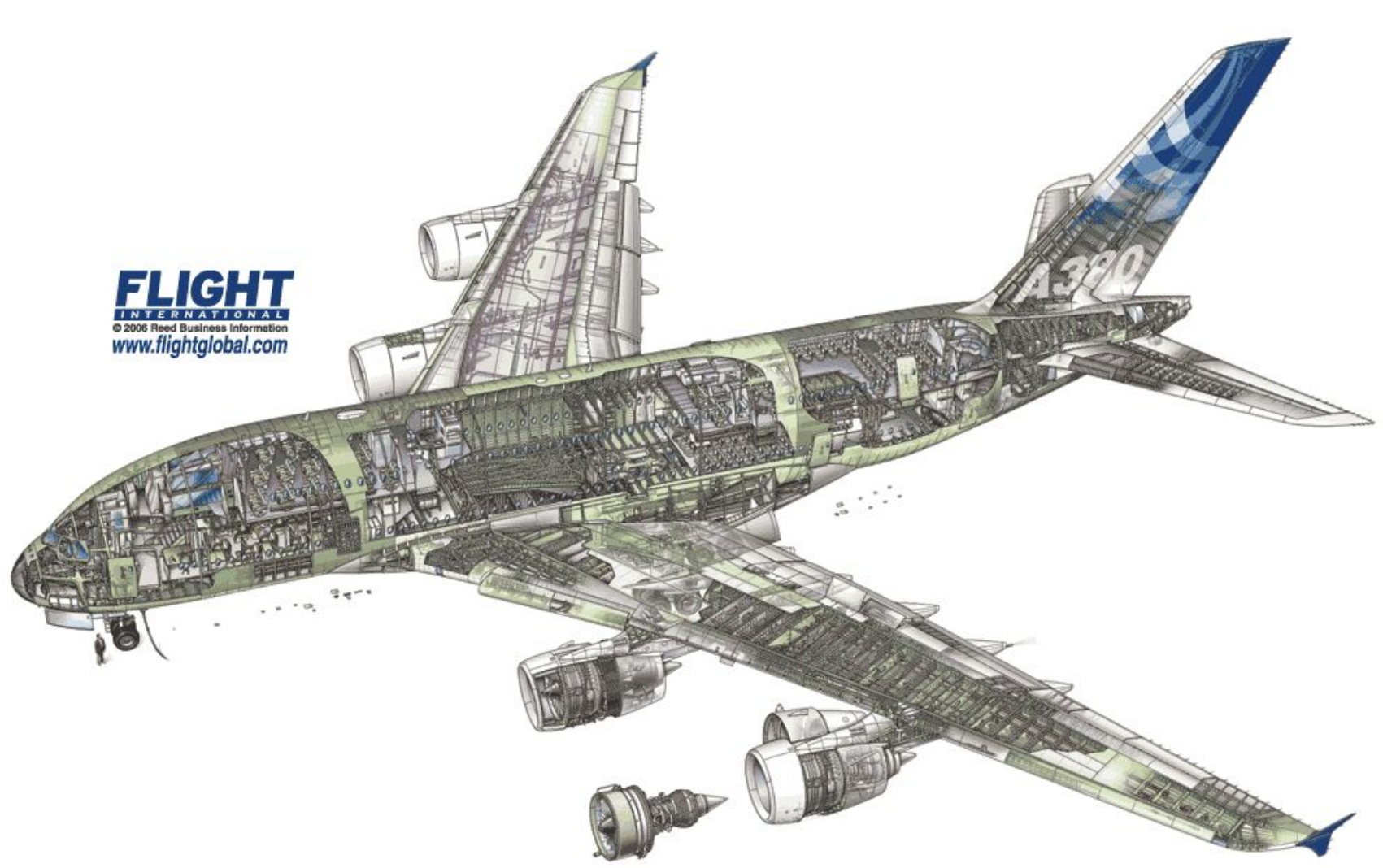
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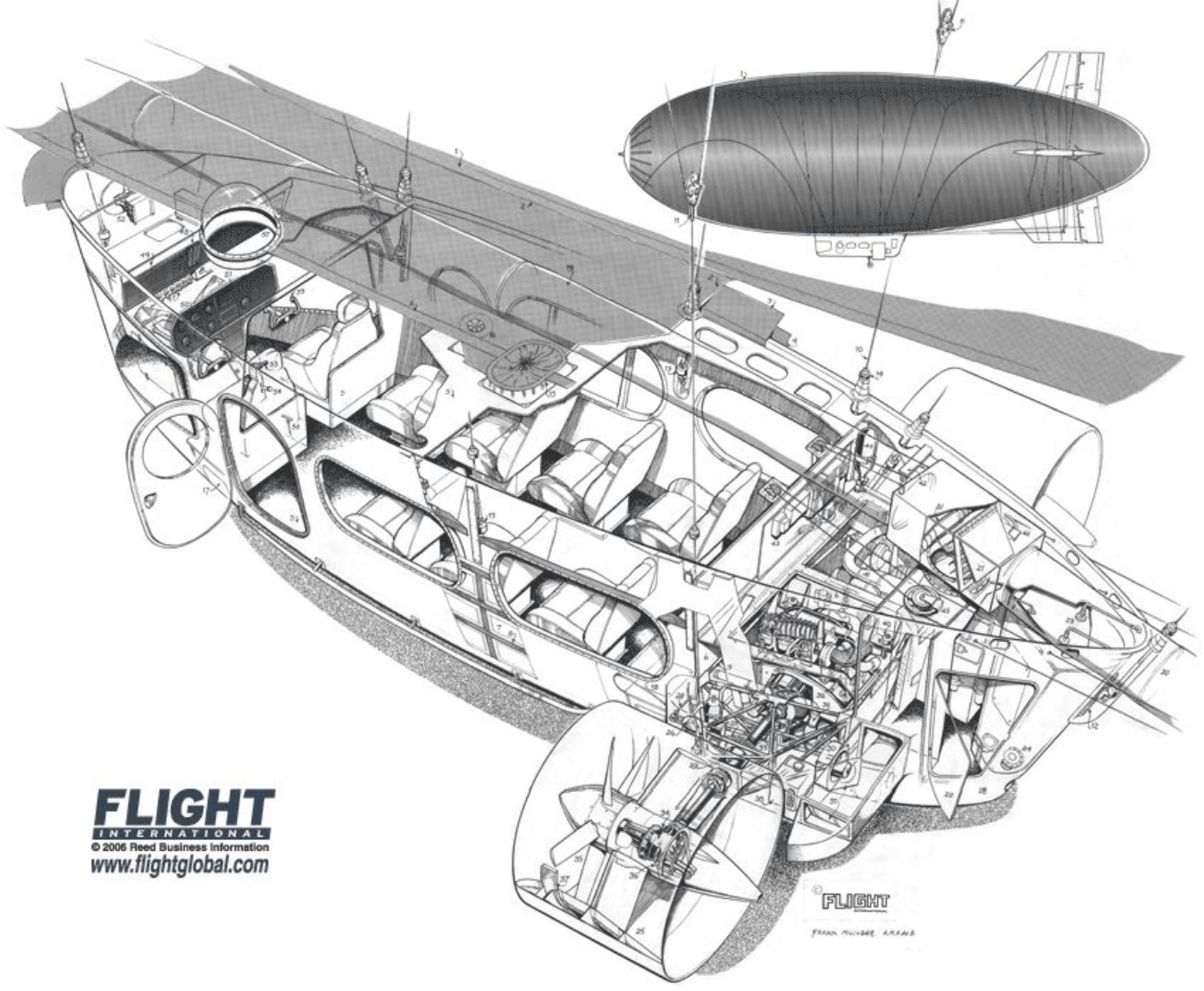
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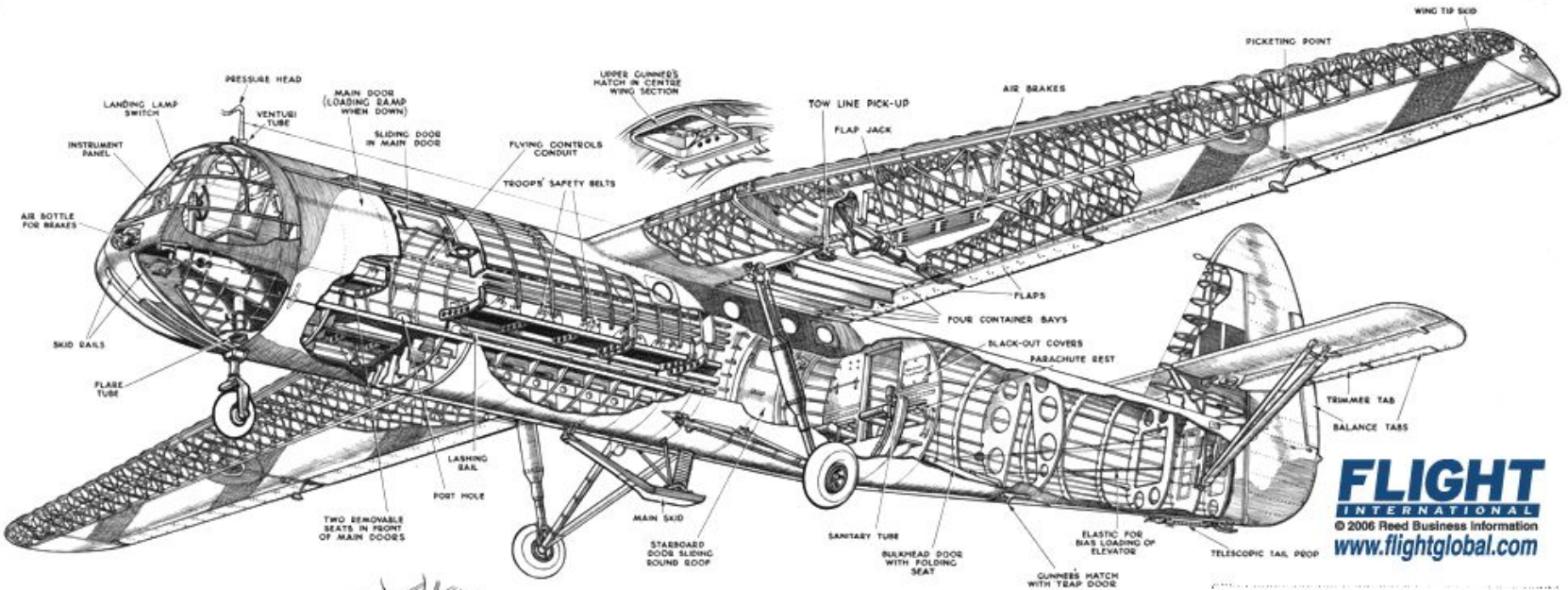


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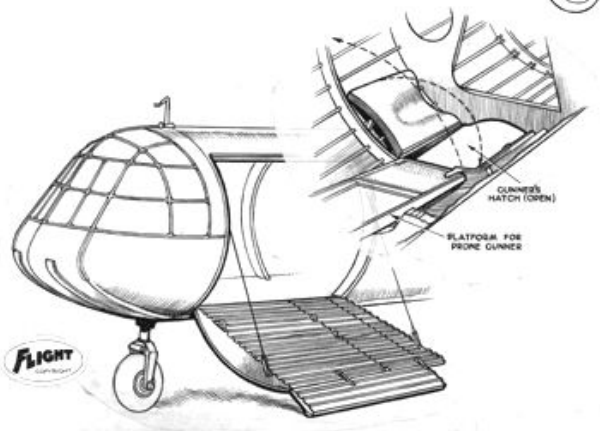

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A380

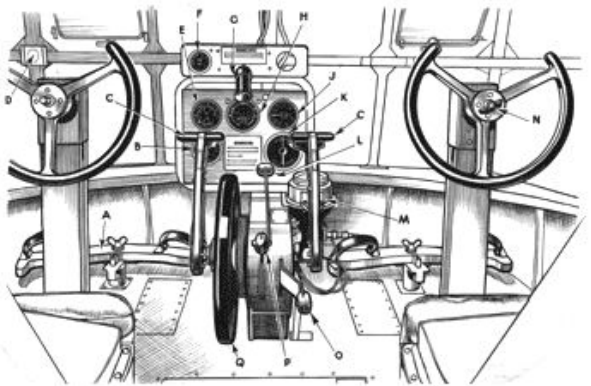


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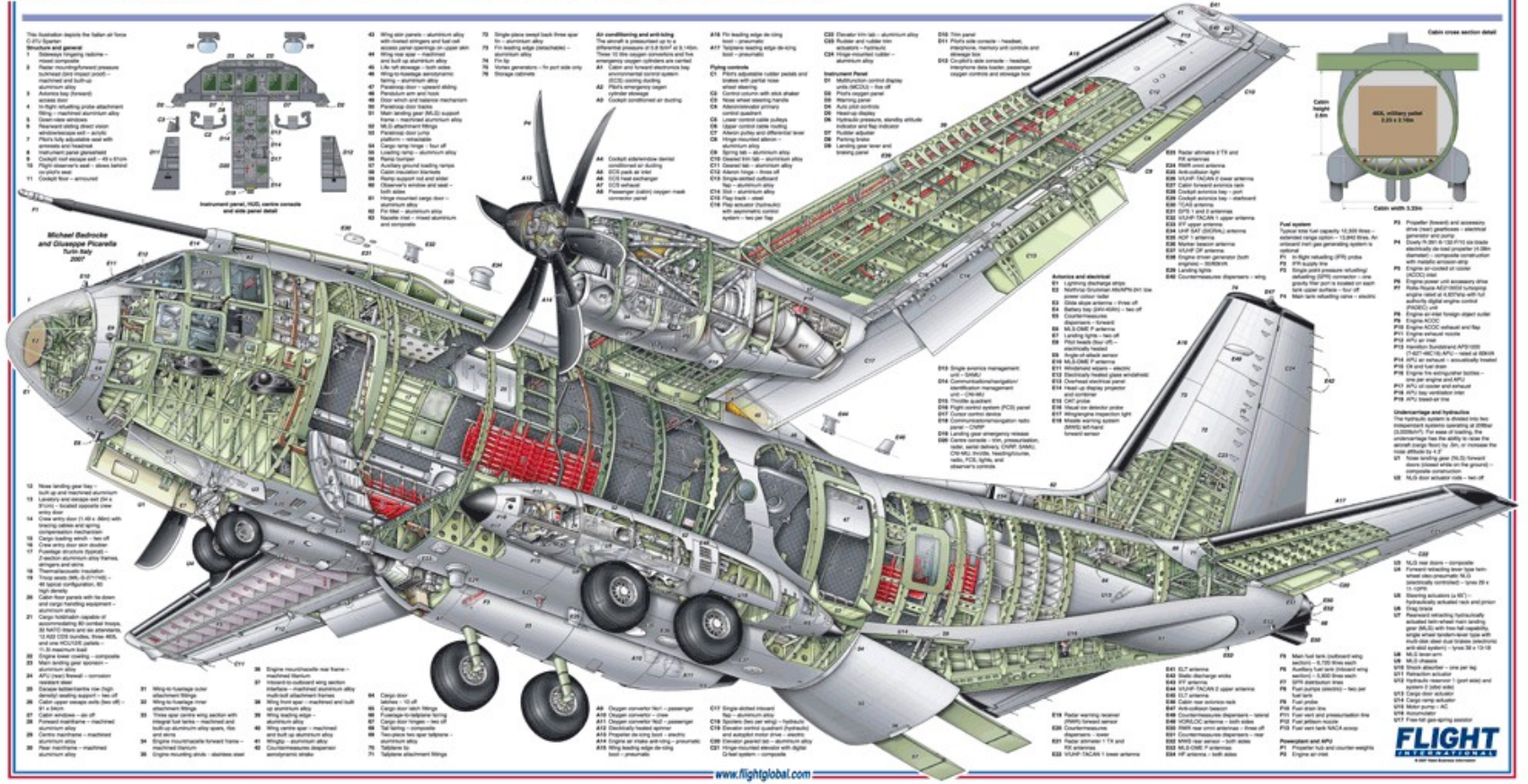


A. S. 51 TRANSPORT GLIDER

DESIGNED to Ministry of Aircraft Production specification No. 26/40, the Horsa carries two pilots and up to 25 troops. Most of the features of the construction and layout are shown in the drawings. In the sketch of the cockpit the rudder bars are easily detached by undoing the wing nut A; B is the altimeter; C, air brake control levers; D, compass deviation card; E, airspeed indicator; F, air pressure gauge; G, instrument panel light; H, artificial horizon; J, rate-of-climb indicator; K, turn and bank indicator; L, tow-release control lever; M, compass; N, wing nut securing starboard control wheel; O, undercarriage jettison lever; P, flap-control lever; Q, elevator trimming wheel.

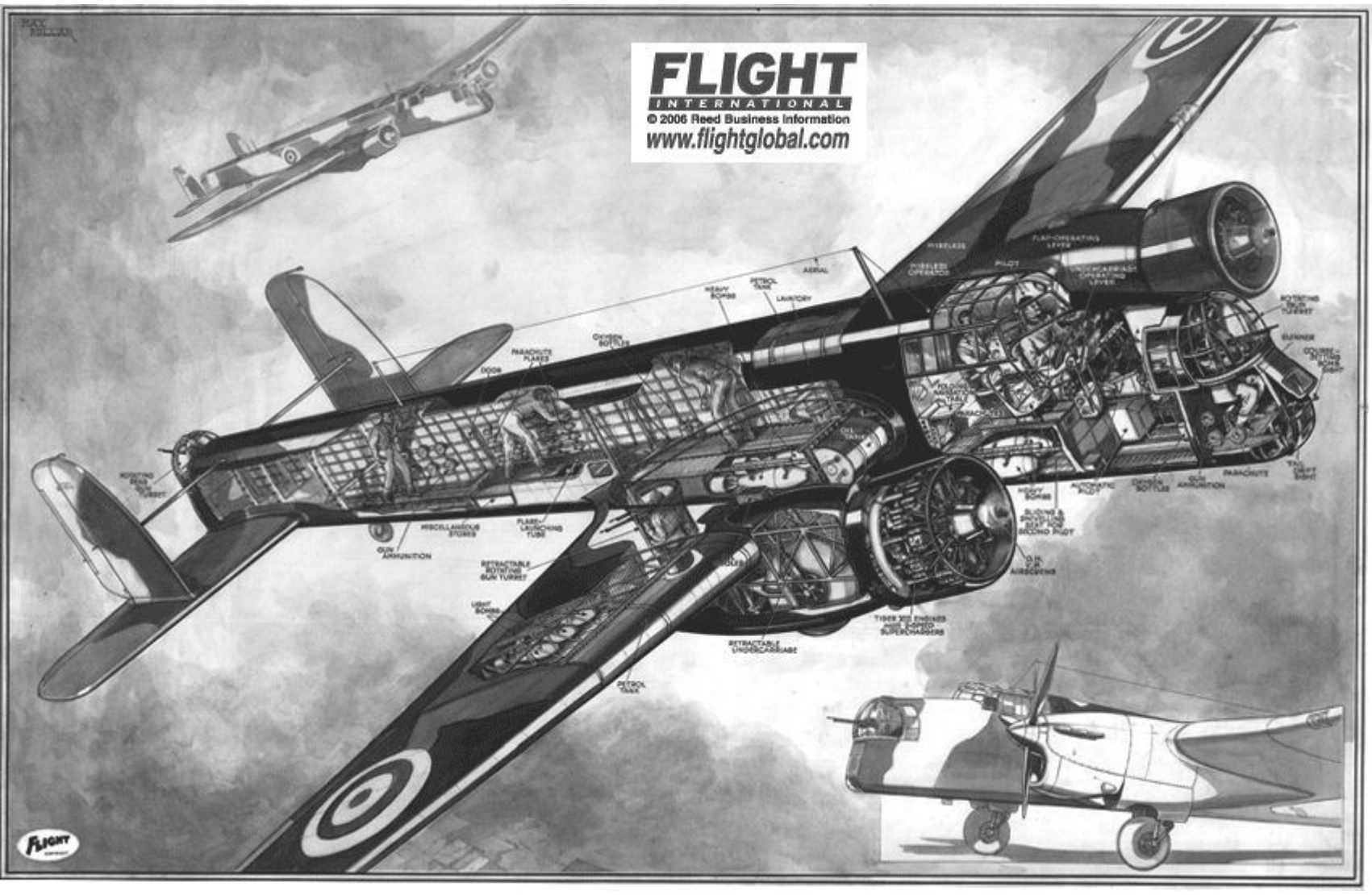
Alenia Aeronautica C-27J SPARTAN

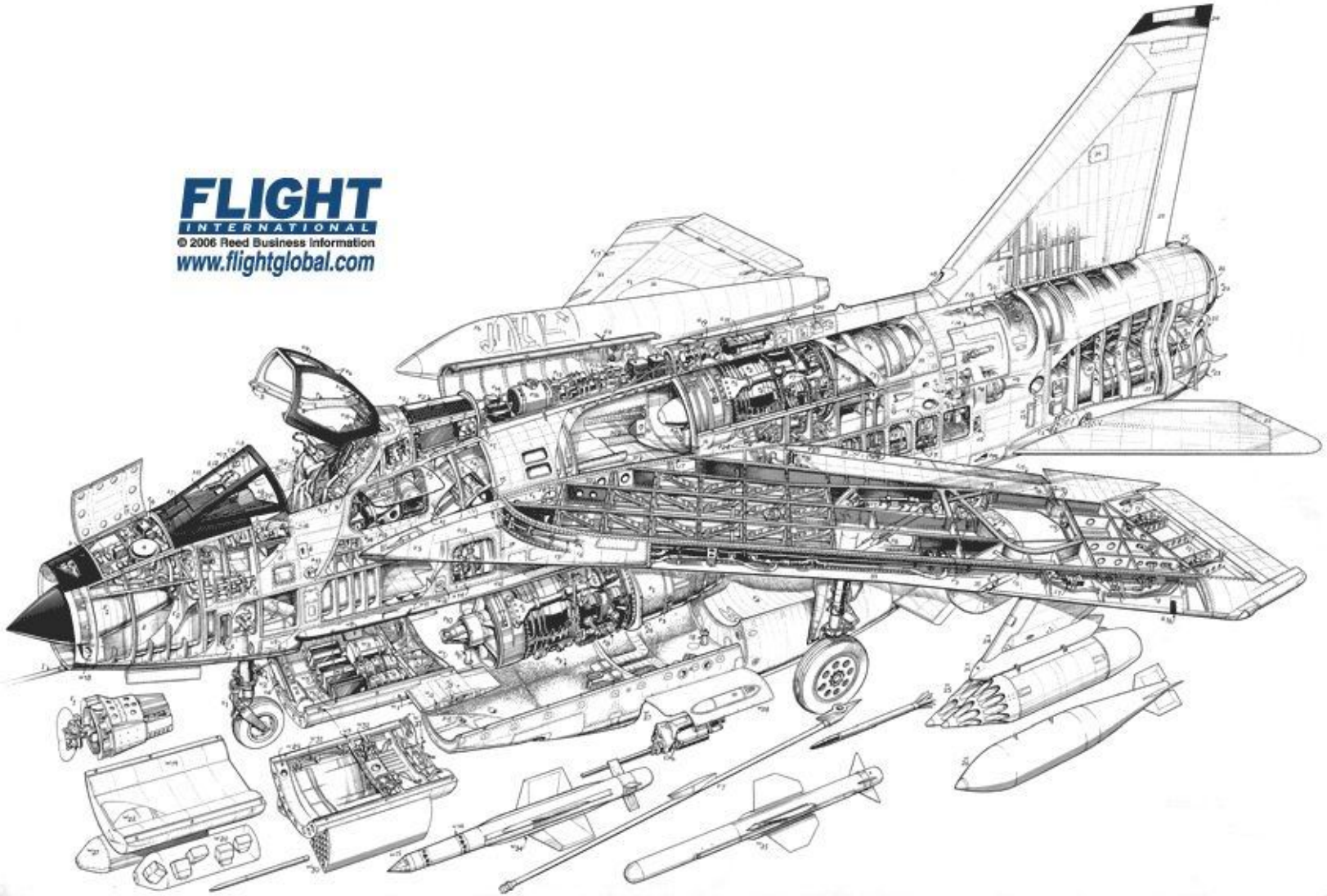
AleniaAeronautica — A Finmeccanica Company | Rolls-Royce | L3 | Honeywell | AleniaNorthAmerica — A Finmeccanica Company

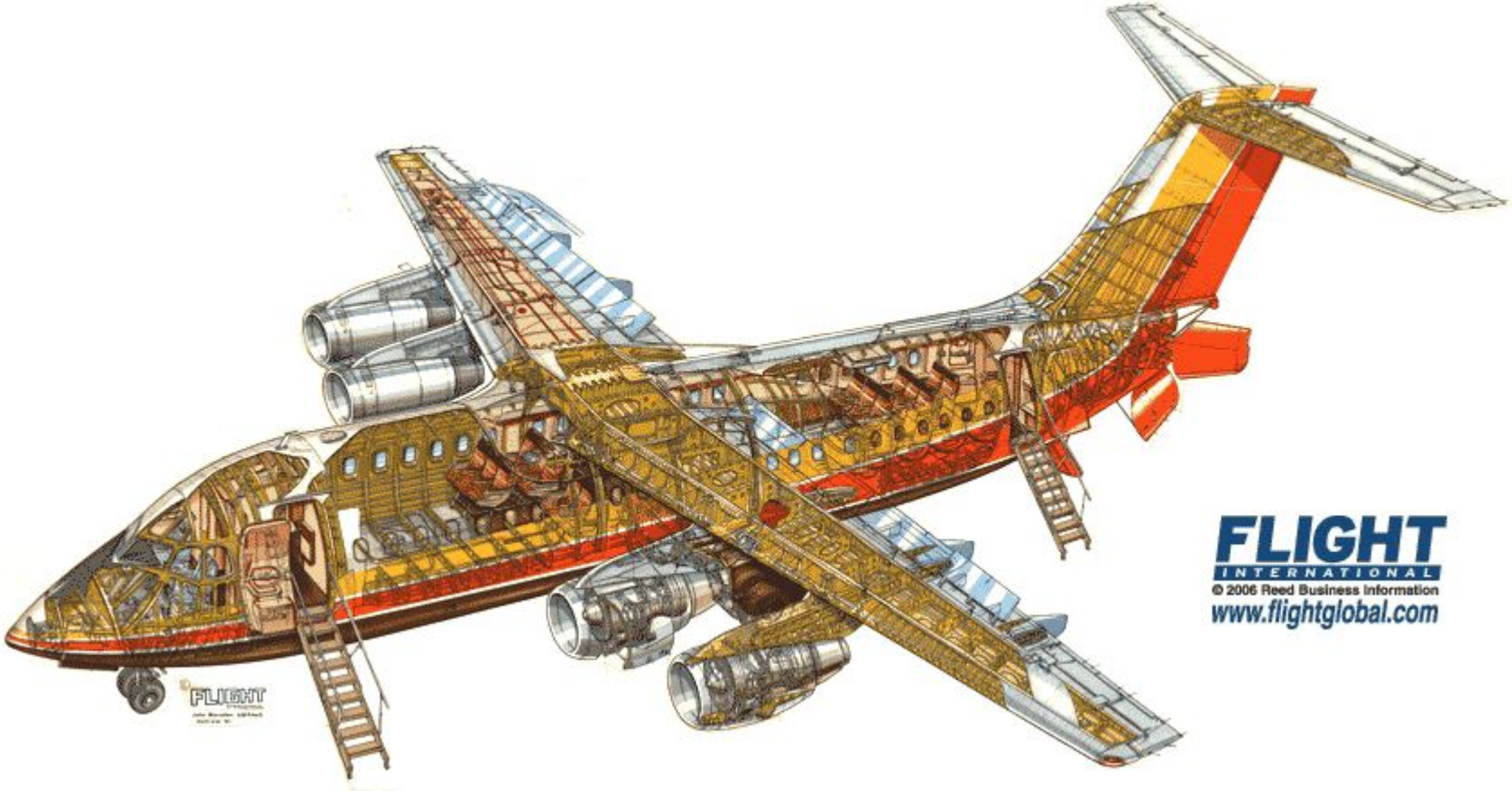


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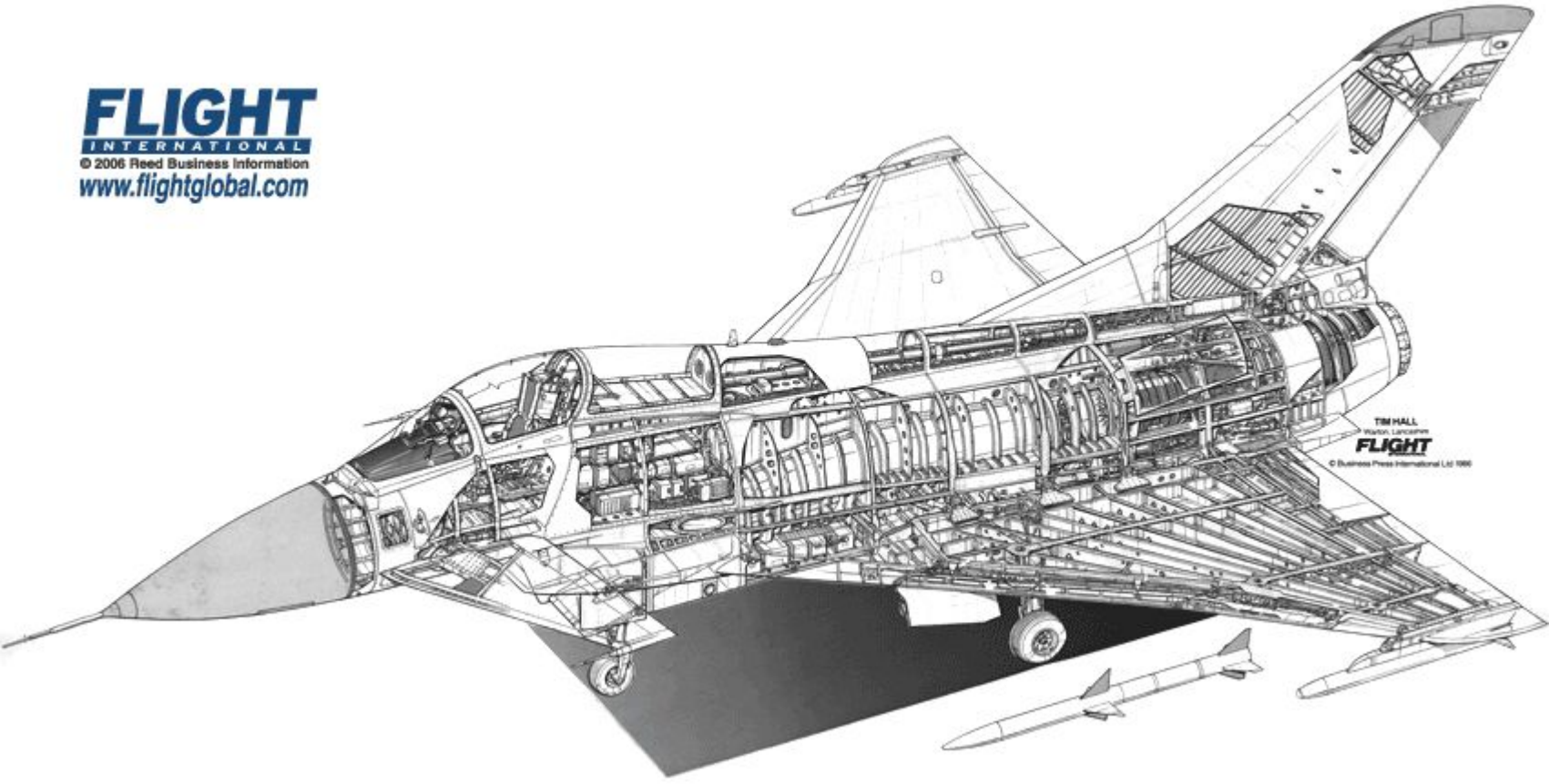

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WIRELESS OPERATOR
PILOT
WIRELESS
AERIAL
PETROL TANK
LAVATORY
HEAVY BOMBS
PARACHUTE FLARES
DOOR
OXYGEN BOTTLES
MISCELLANEOUS STORES
FLARE-LAUNCHING TUBE
GUN AMMUNITION
RETRACTABLE UNDERCARRIAGE
PARACHUTE
GUN AMMUNITION
OXYGEN BOTTLES
AUTOMATIC PILOT
HEAVY BOMBS
SLIDING SEAT FOR SECOND PILOT
O.R. OF AEROFOILS
TIGER VIII ENGINES WITH TWO-SPEED SUPERCHARGERS
RETRACTABLE UNDERCARRIAGE
PETROL TANK

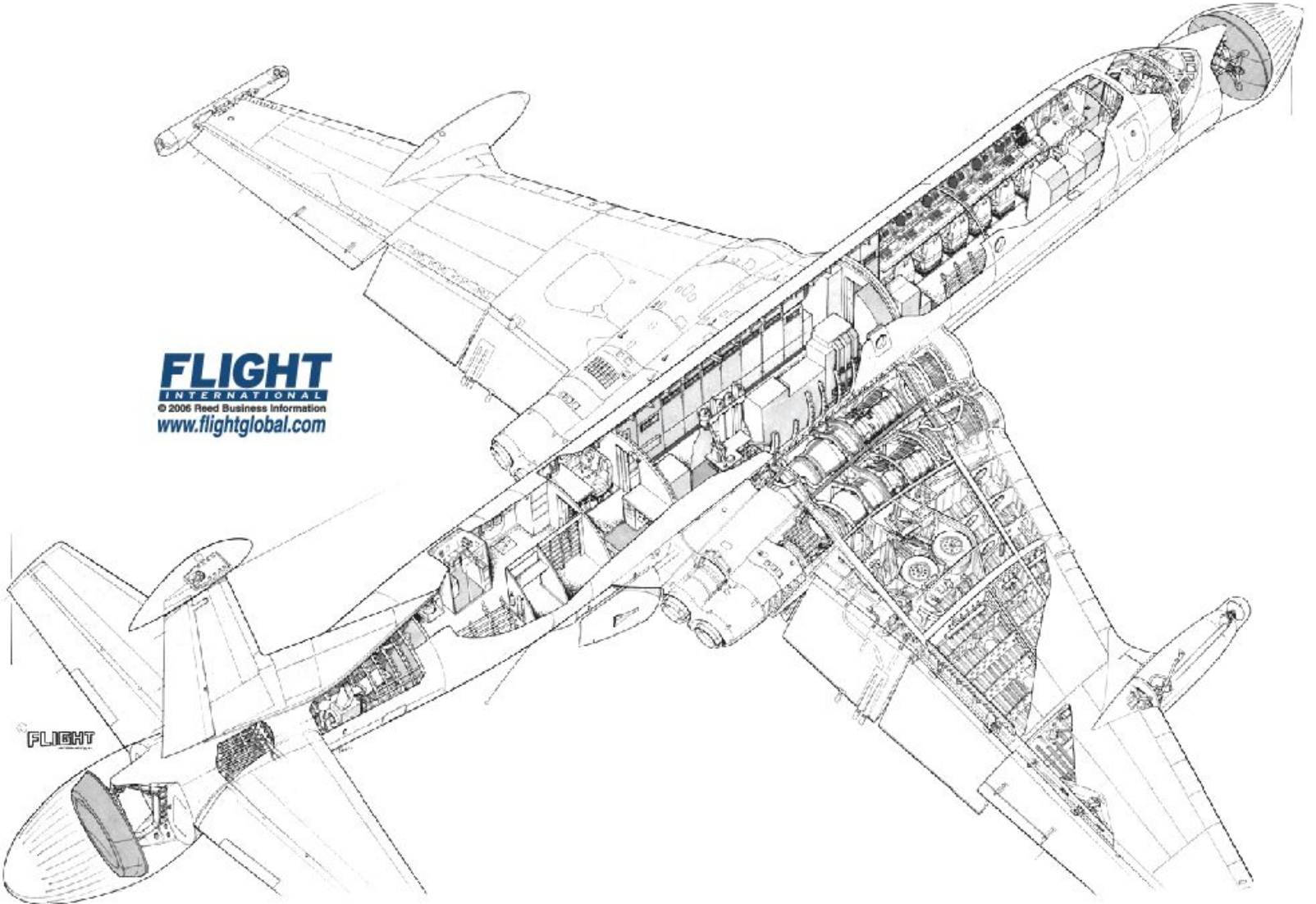

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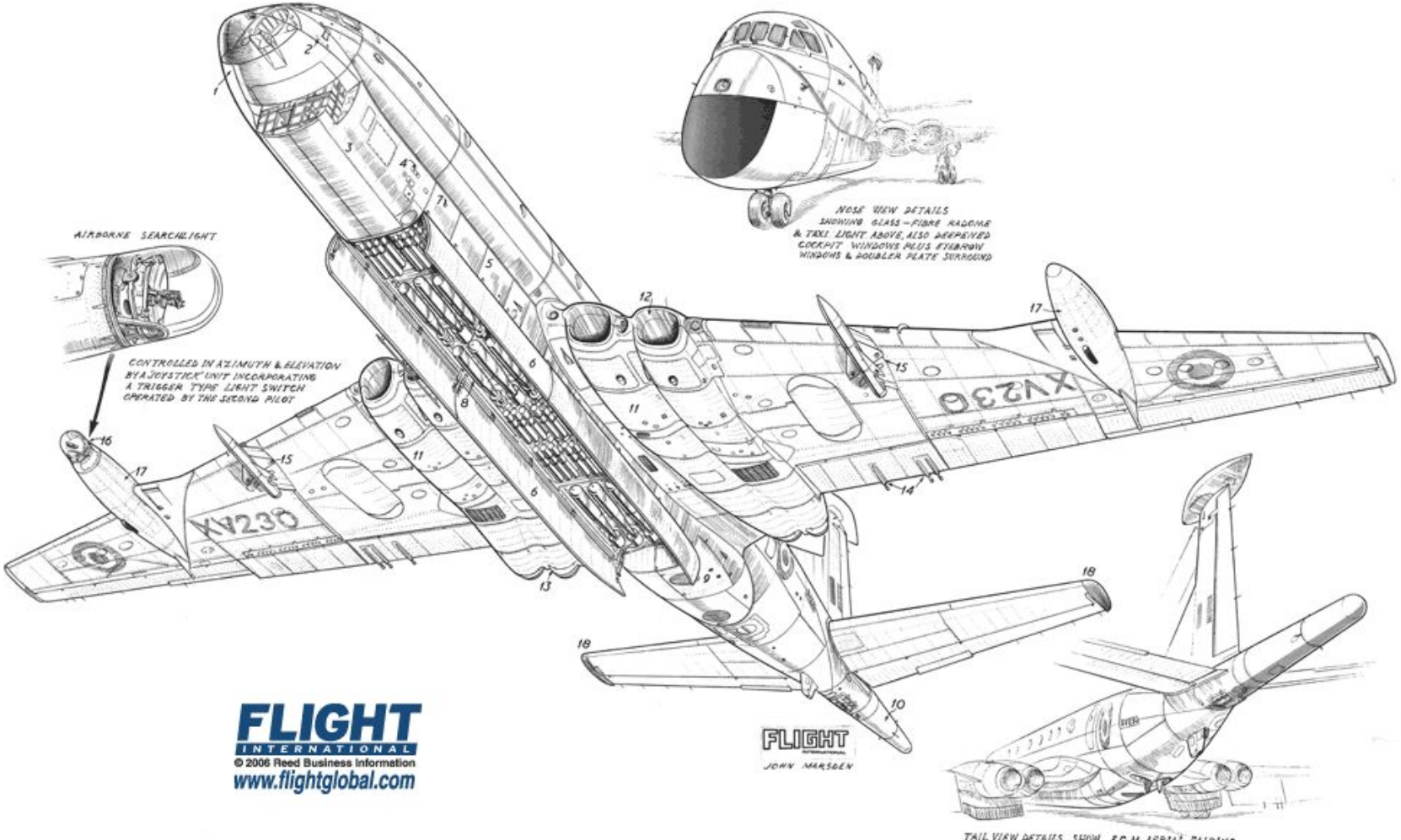


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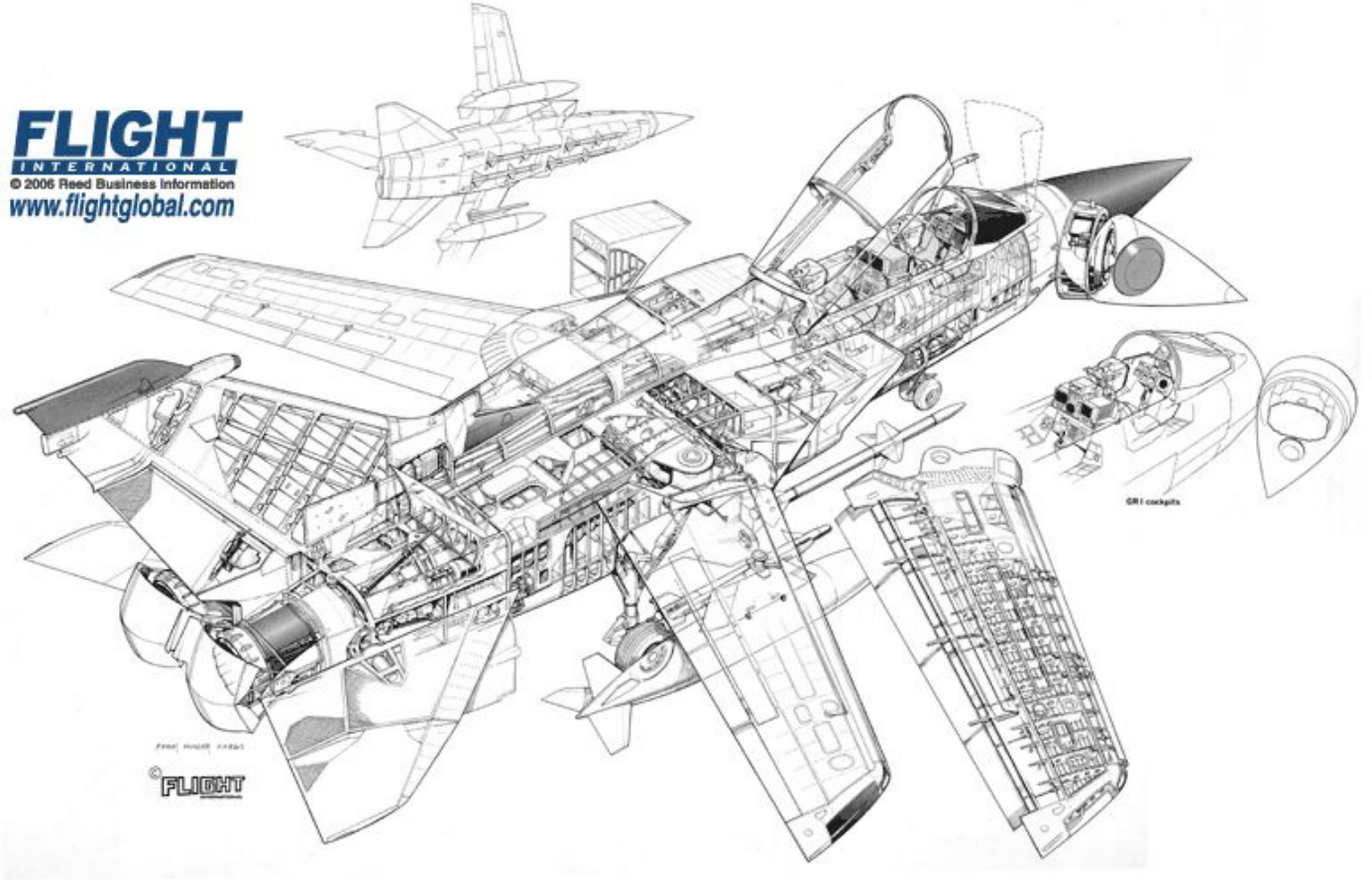


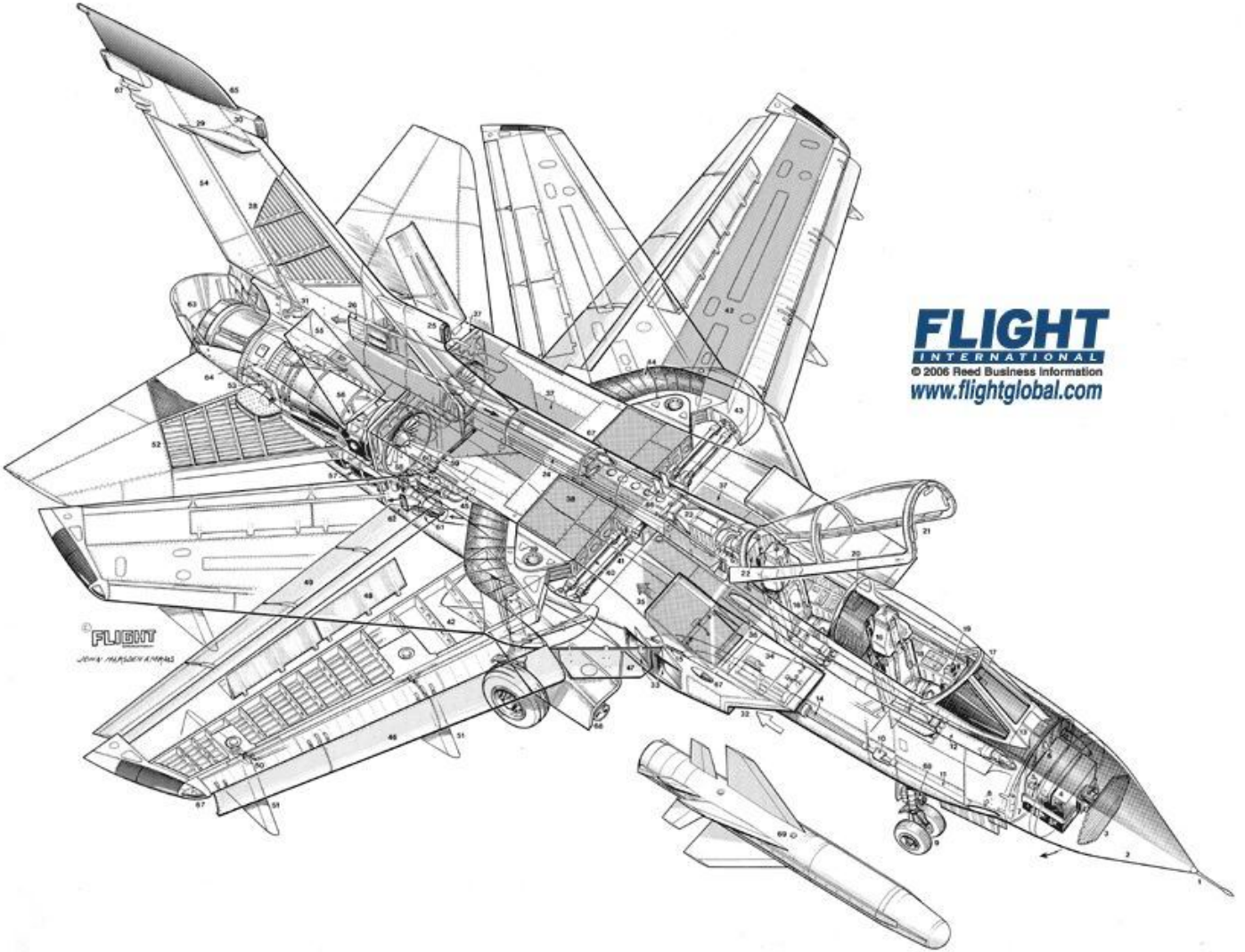

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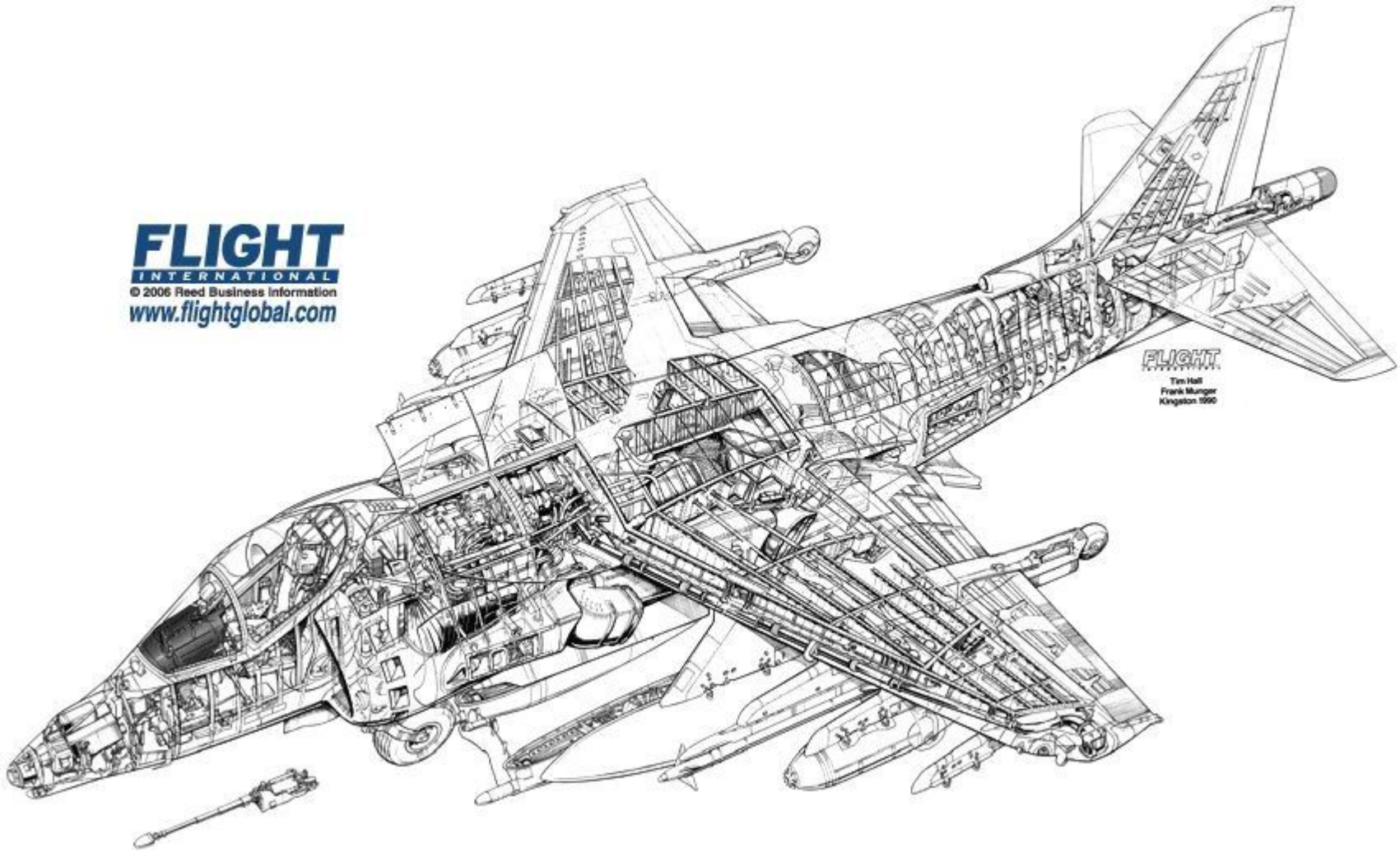


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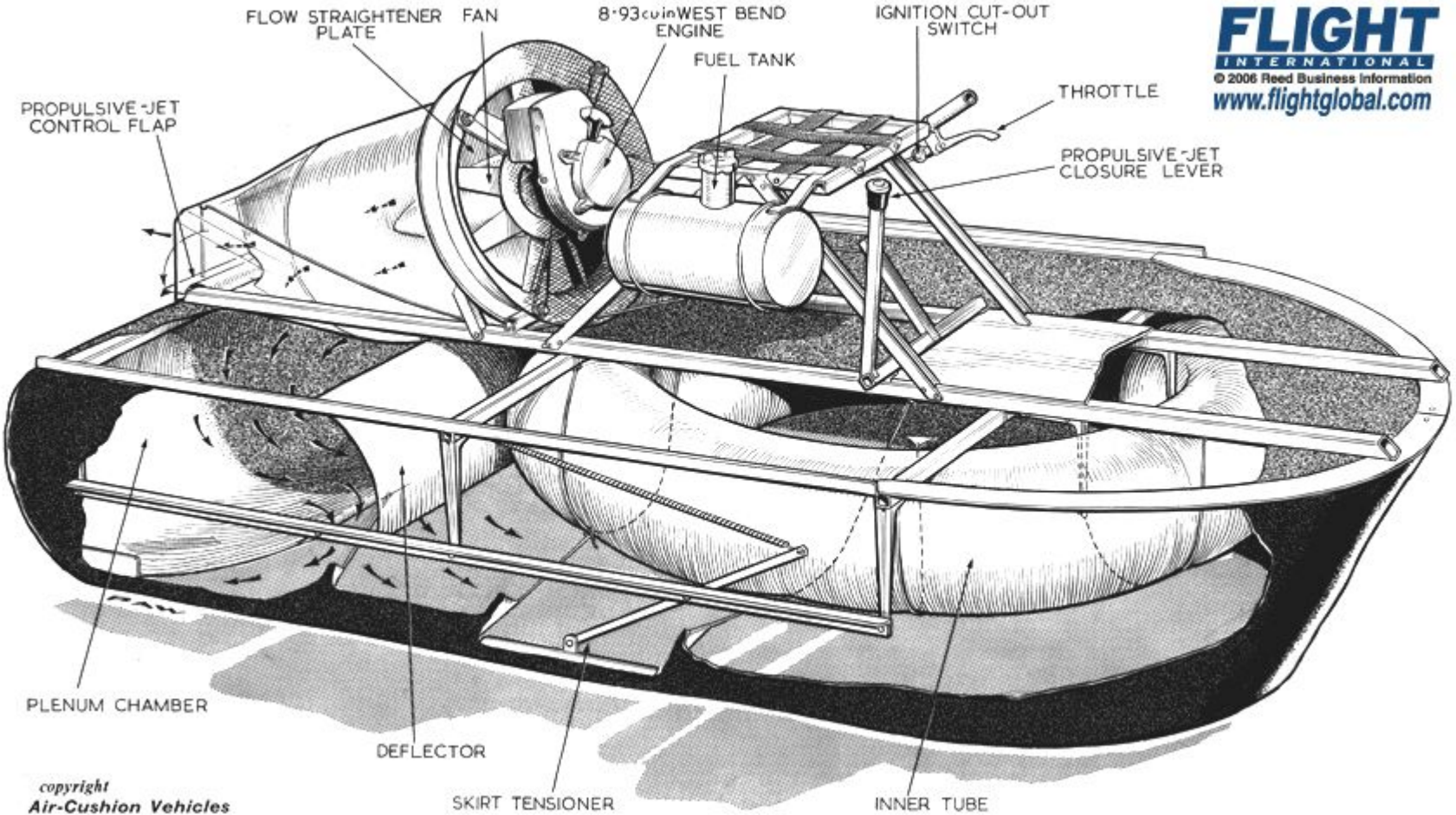

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Tim Hall
Frank Munger
Kingston 1990

BERIEV Be-200



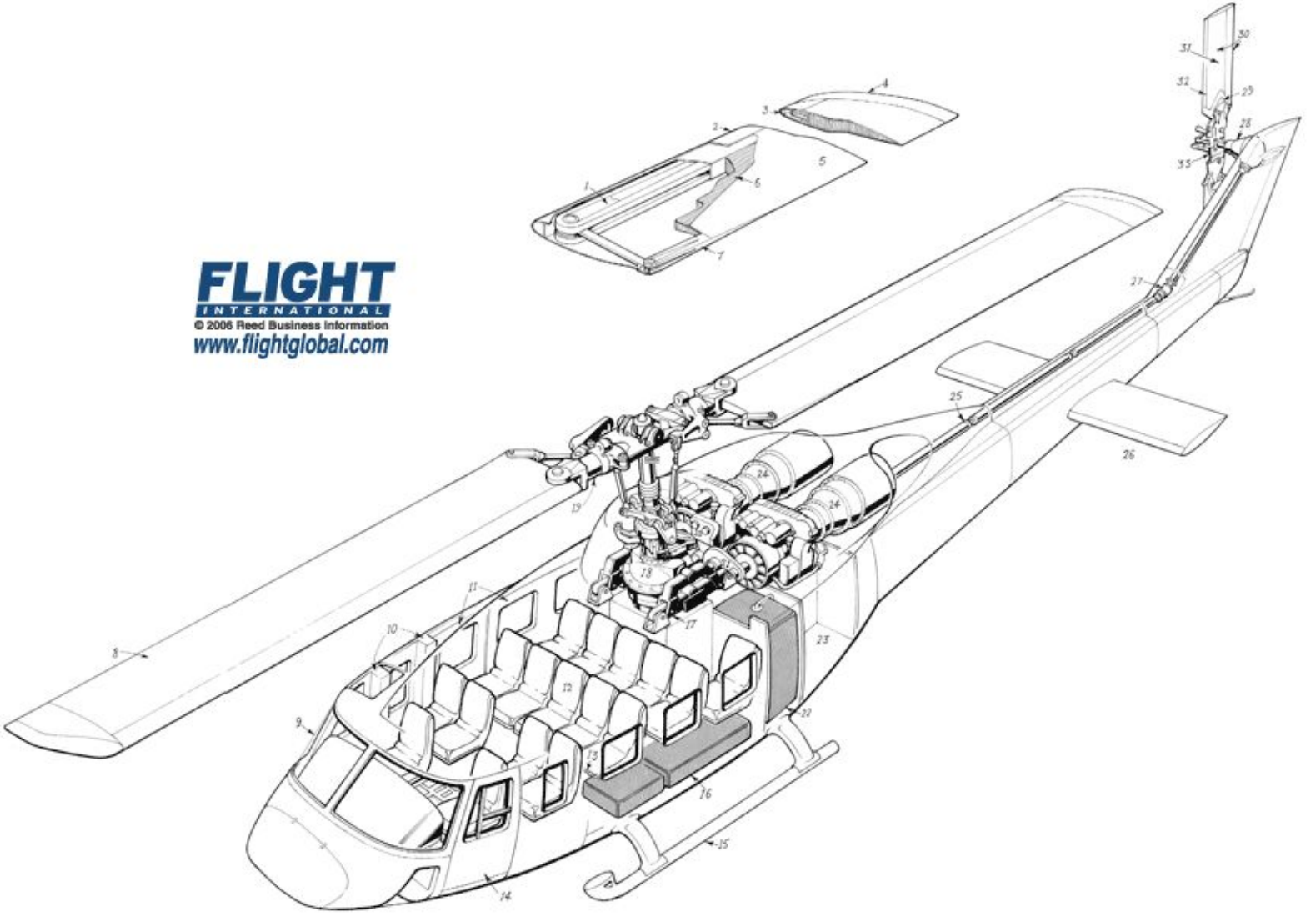
Structure and general

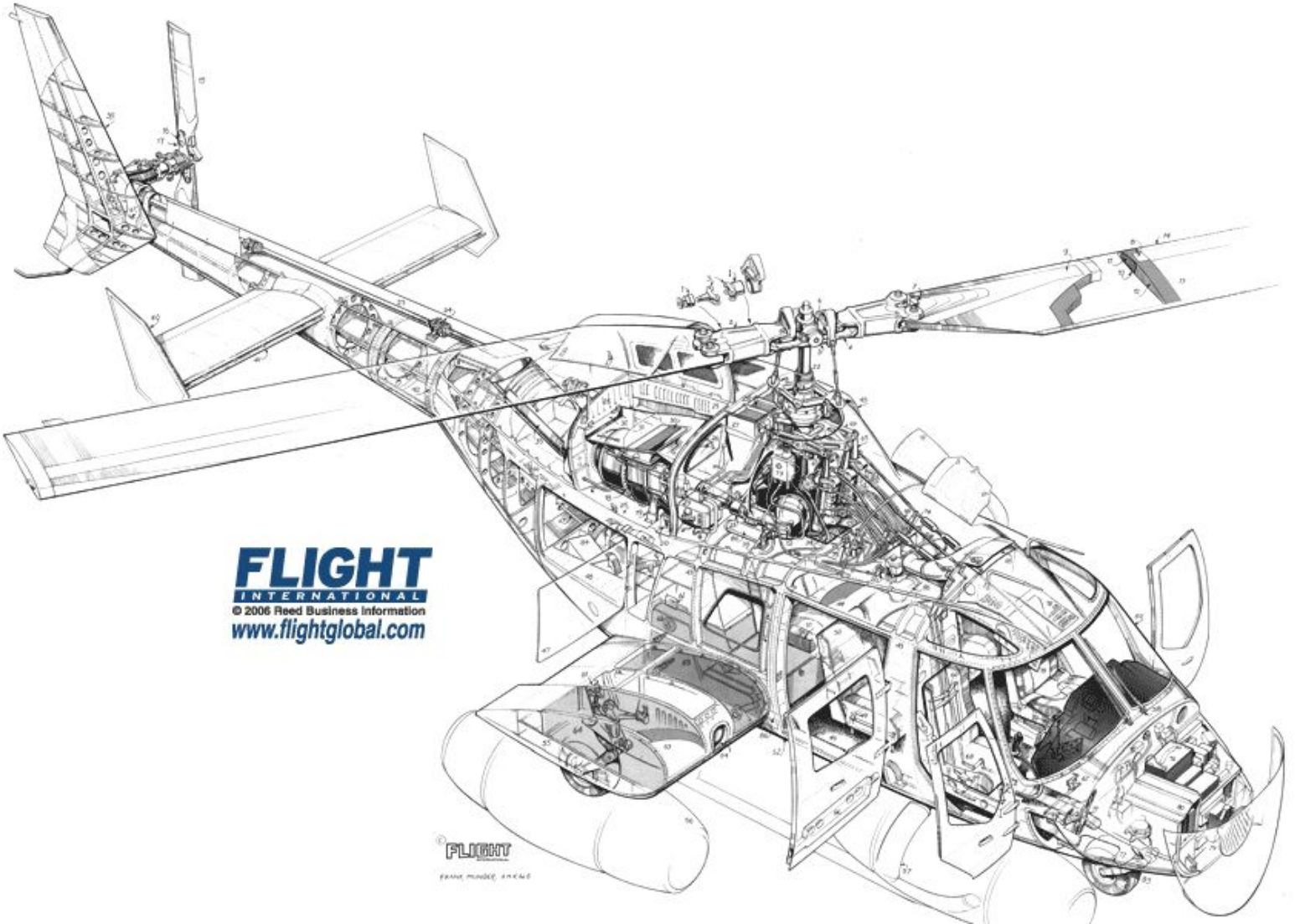
1 MP485 weather radar
2 Bird spray-by strake
3 Mooring cleat
4 Sliding window (pilot and co-pilot)
5 LCD glass cockpit incorporating 8 Honeywell EFIS displays
6 Fly-by-wire control columns
7 Avionics AFMA-200M integrated flight navigation-communications suite (under utility compartment/galley floor)
8 Crew galley
9 Utility compartment
10 Cockpit door
11 VHF antenna
12 Cargo door incorporating service hatch
13 Cargo door actuator — hydraulic
14 Passenger door
15 Nose landing gear
16 Side extending staircase
17 Water control crew station
18 Pressurised crew/cargo compartment
19 Cargo/passenger compartment
20 Emergency exit
21 High-strength aluminium/lithium alloy hull
22 Cabin windows
23 Watertight compartments
24 Fire-suppression system
25 Forward waterbank group
26 Pressure balancing ducts
27 Mid-hull spray deflector
28 Fire-retardant tanks — total capacity 1.2m³
29 Auxiliary power unit
30 Outboard wing section — detachable
31 Full-span leading-edge slat
32 Spoiler/lift dumper
33 Single slotted flap
34 Flap track fairing
35 Wingtip float and pylon
36 Light shutter
37 Static discharge wicks
38 Aileron
39 Main landing gear
40 Water scoop, (two off) — uptake 121in. long
41 Waterbank door (right off) with automated opening sequencing
42 Waterbank group — total forward and aft water tank capacity 12,000 litres
43 Hydrodynamic compensator — aids unstick from water
44 Engine pylon
45 ZMKB D-436TP turbofan (Be-200) — rated at 16,865lb
46 Rolls-Royce BR715 autoritan with FADEC (Be-200RR) — rated at 19,000lb
47 Rear access door
48 Crew toilet
49 Utility compartment
50 Water rudder
51 Variable incidence tailplane
52 Water-in-compartment light
53 Anti-collision light
54 Taxi light
55 Ram air turbine — retractable
56 Wing fuel tanks — total capacity 59,130 litres

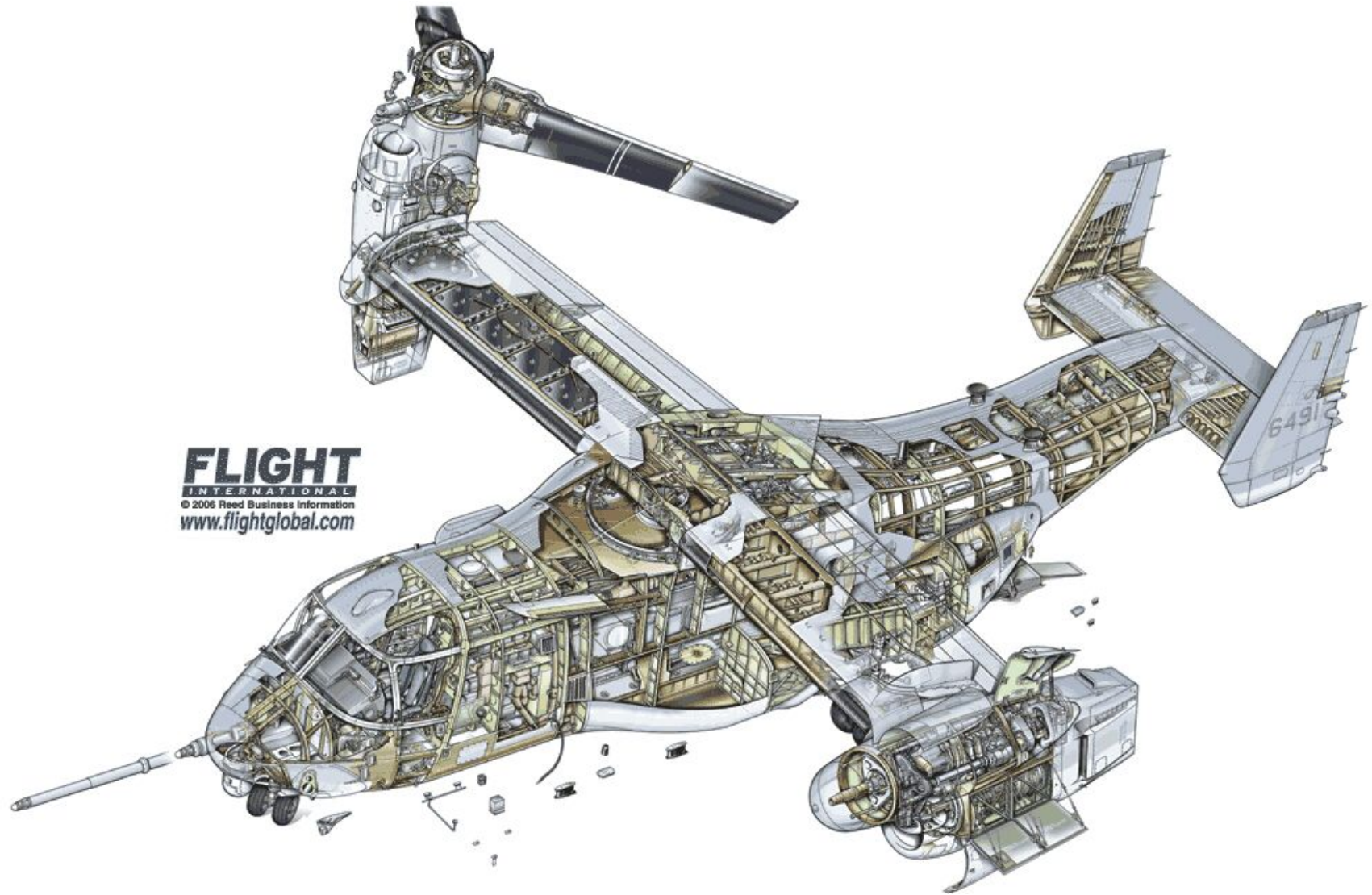


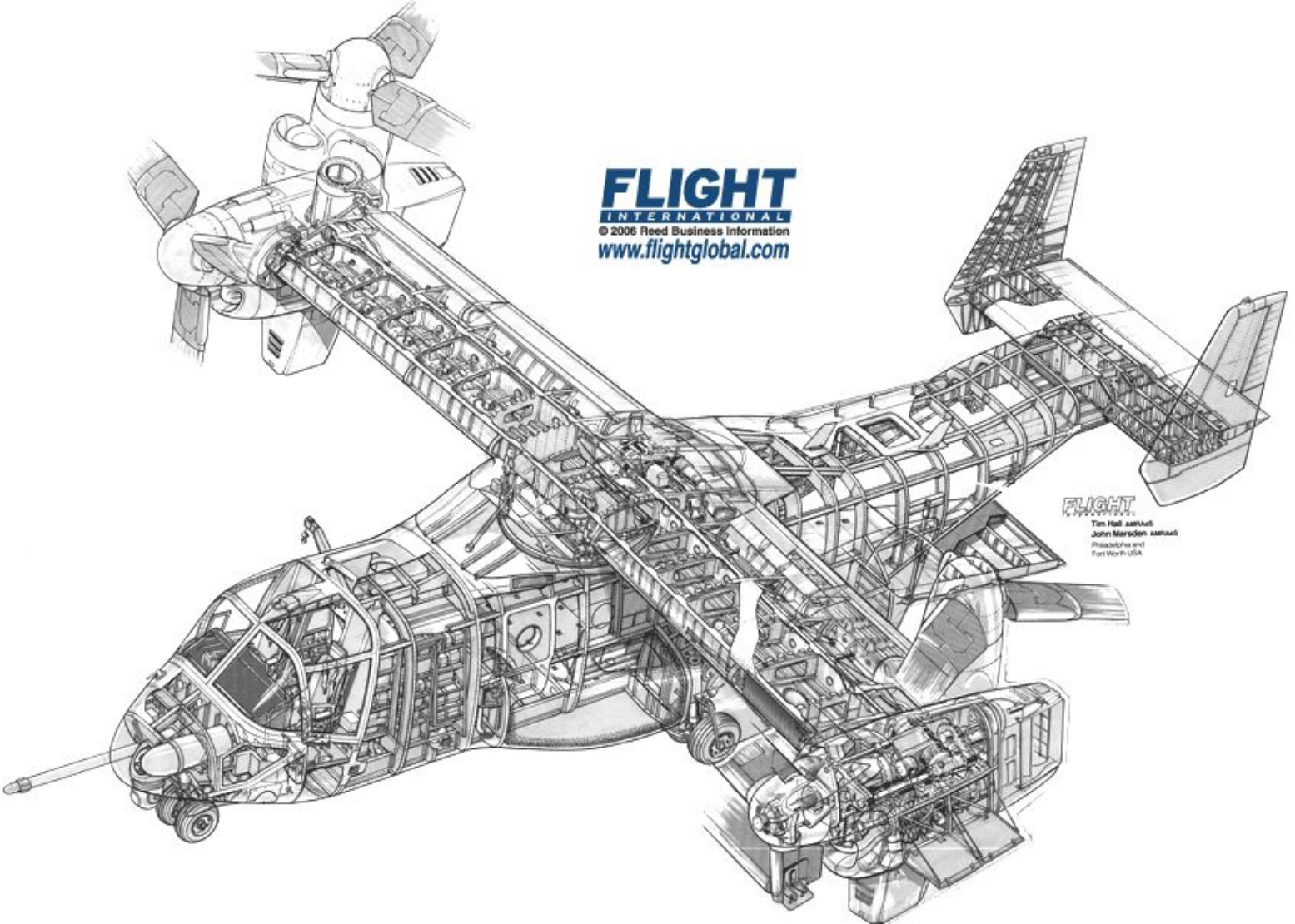
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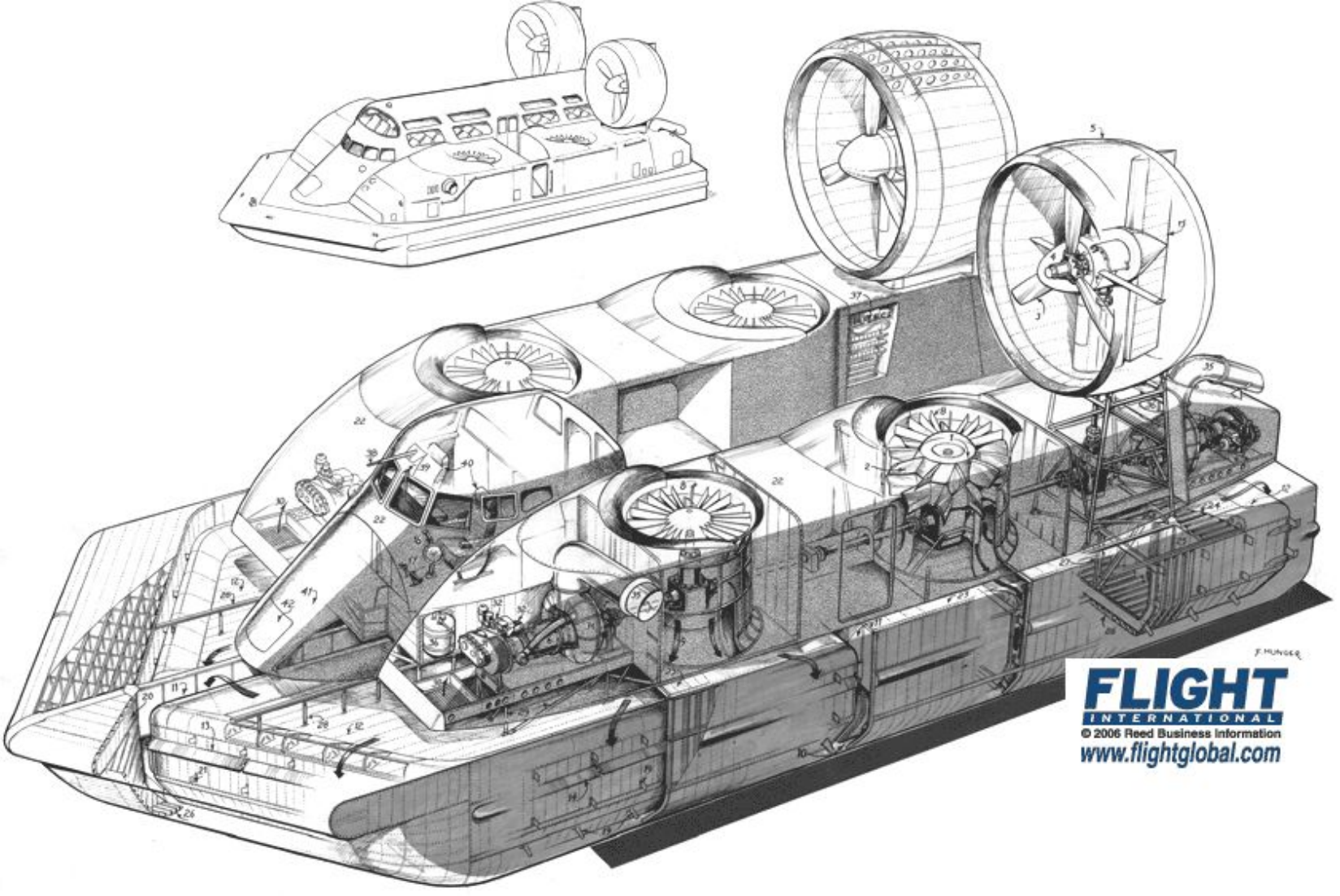
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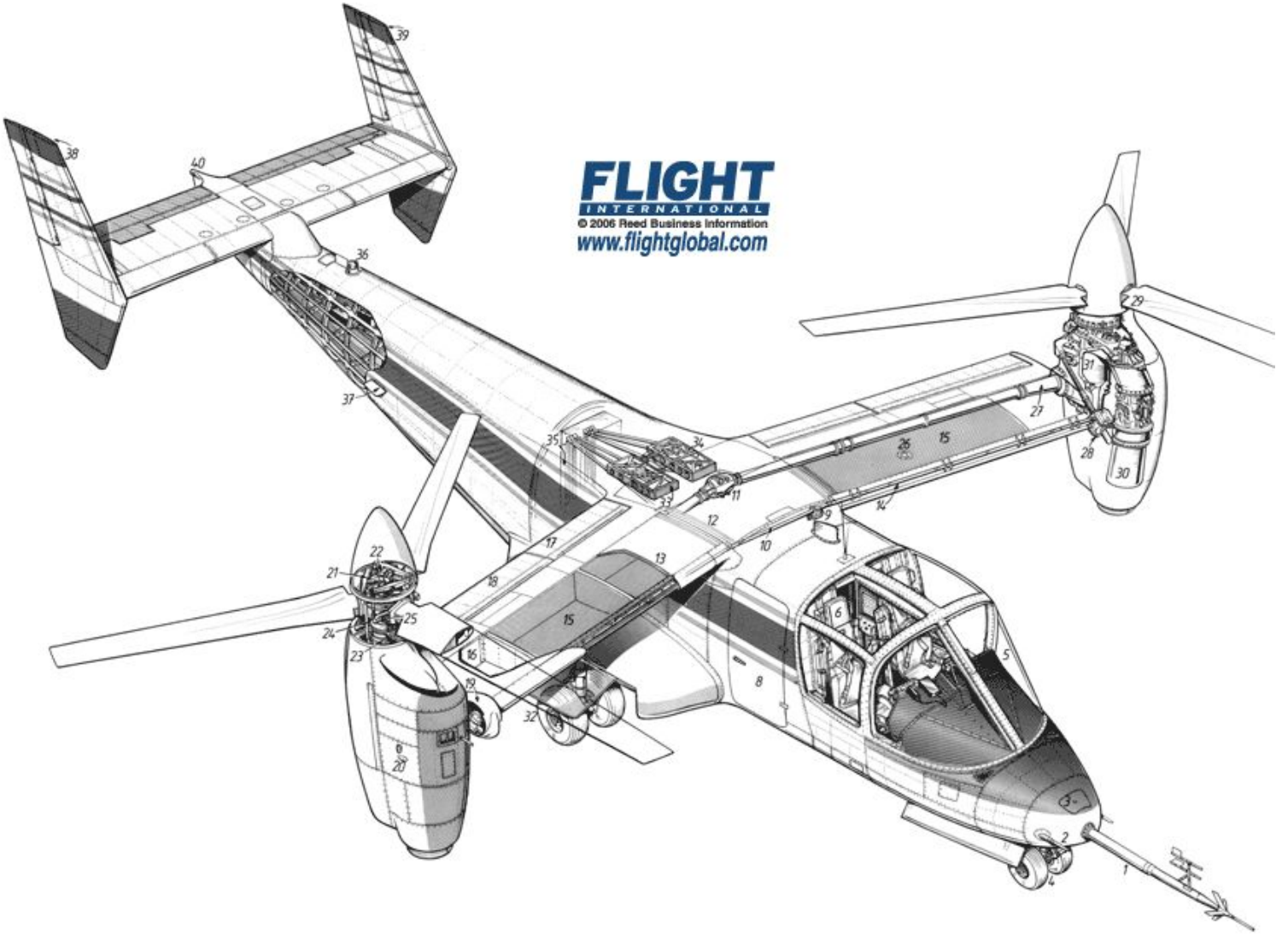

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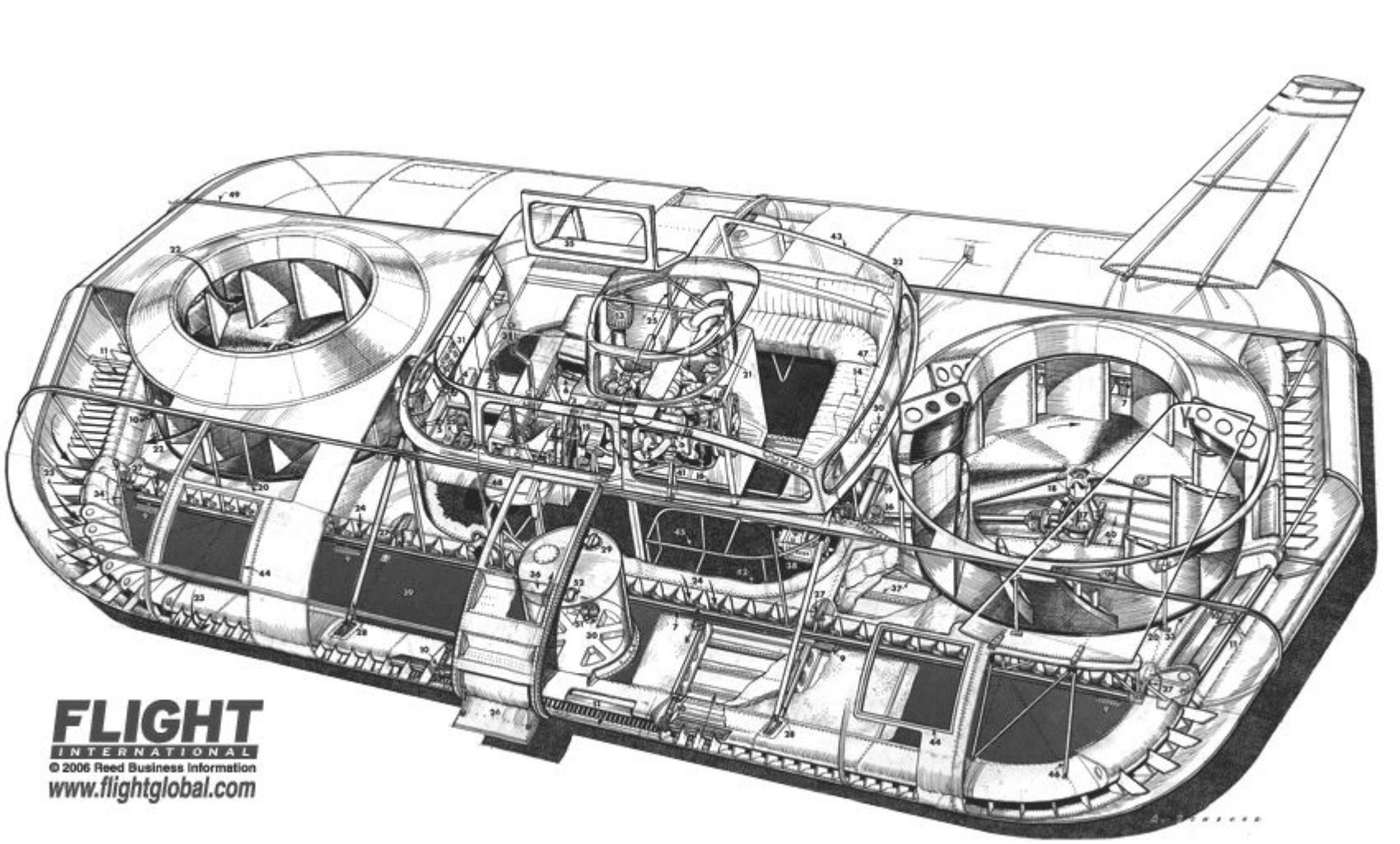

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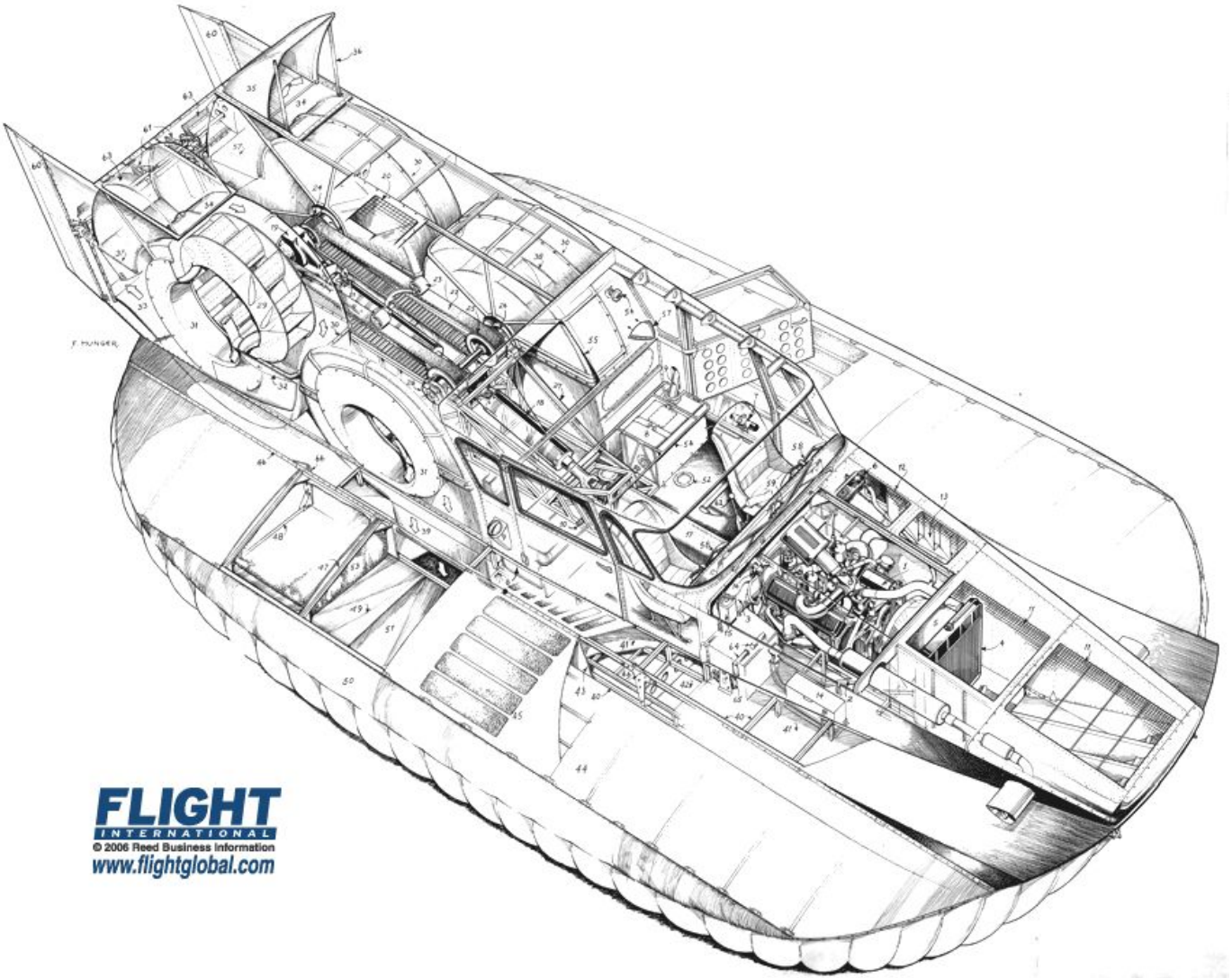


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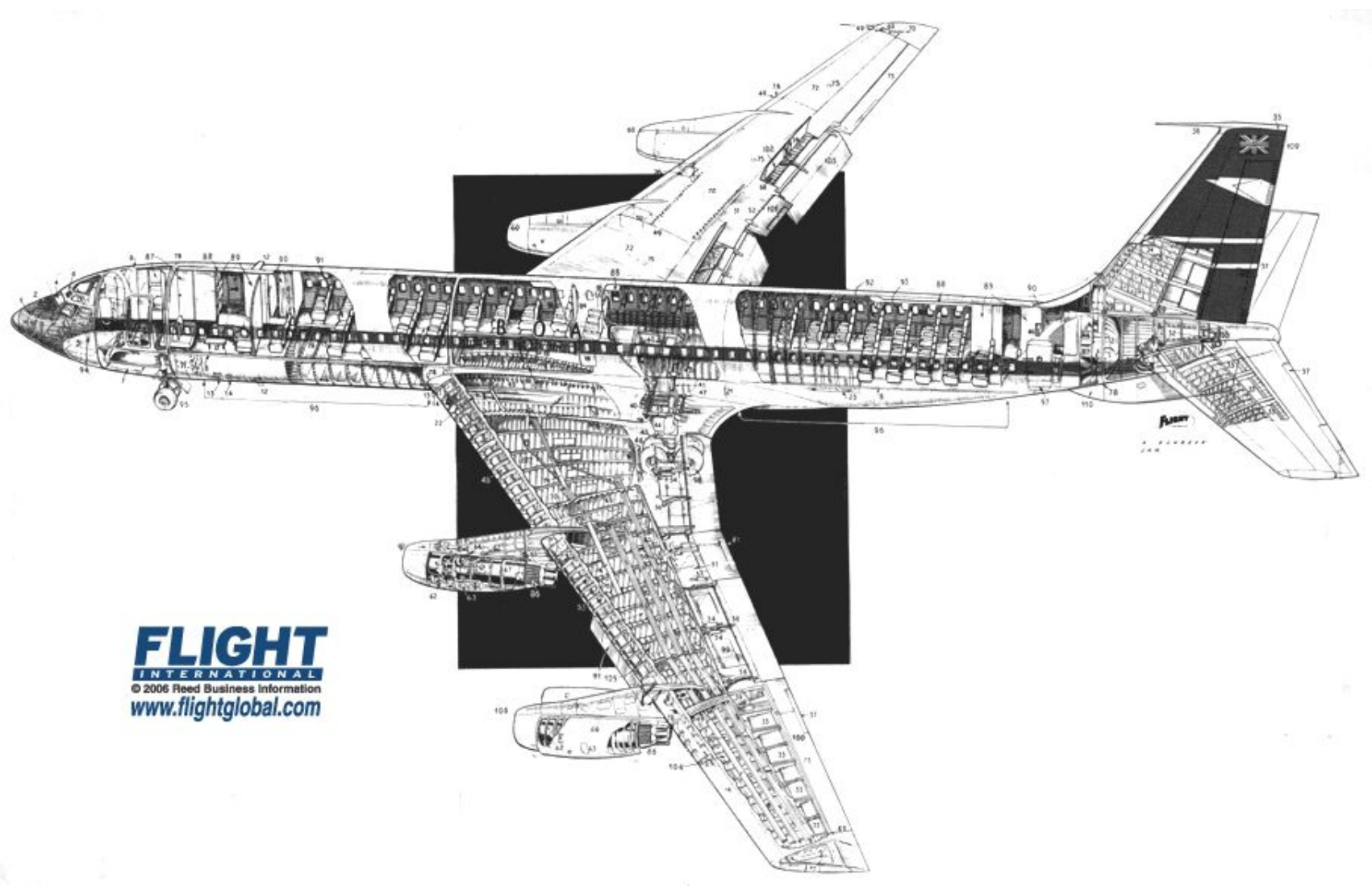

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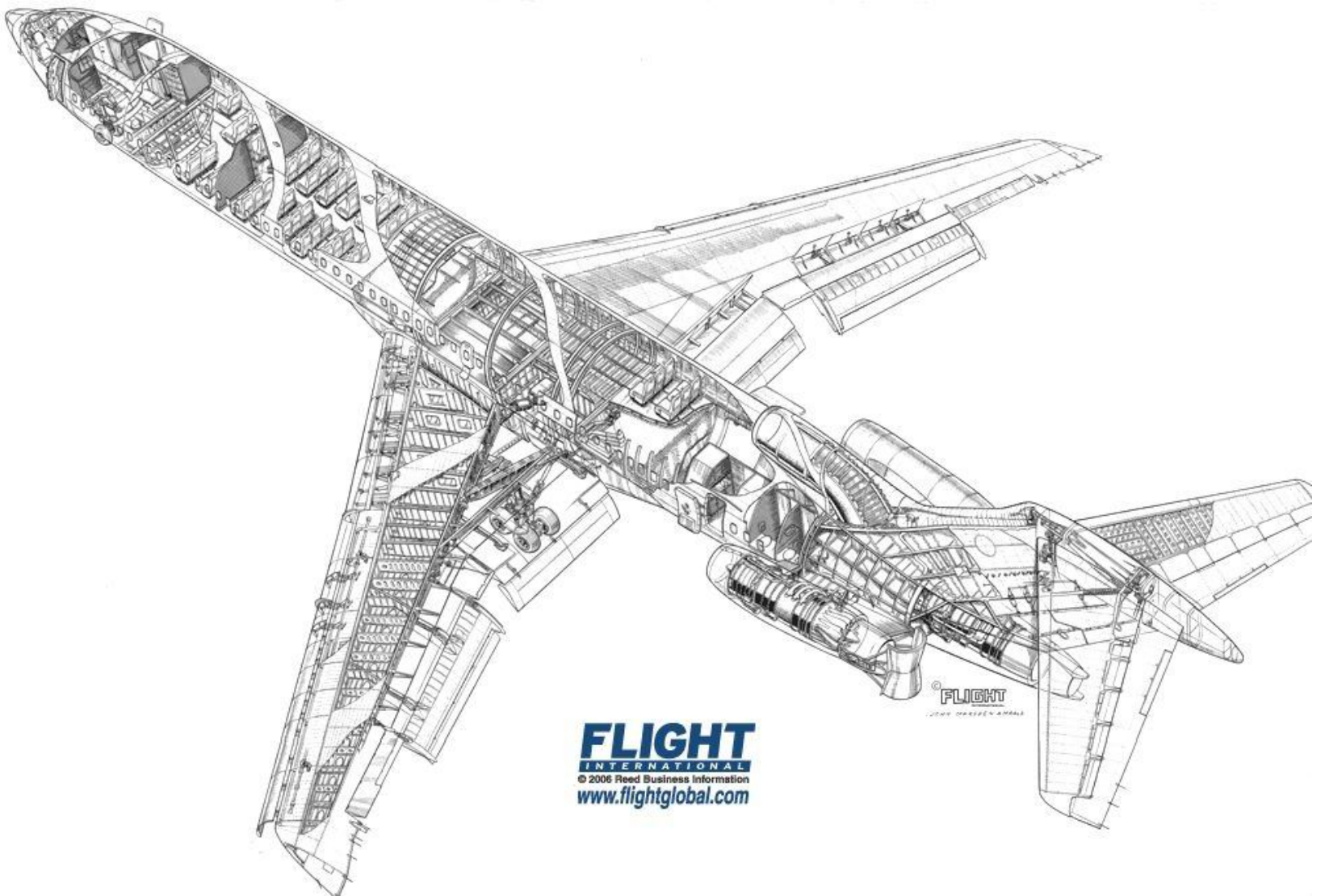
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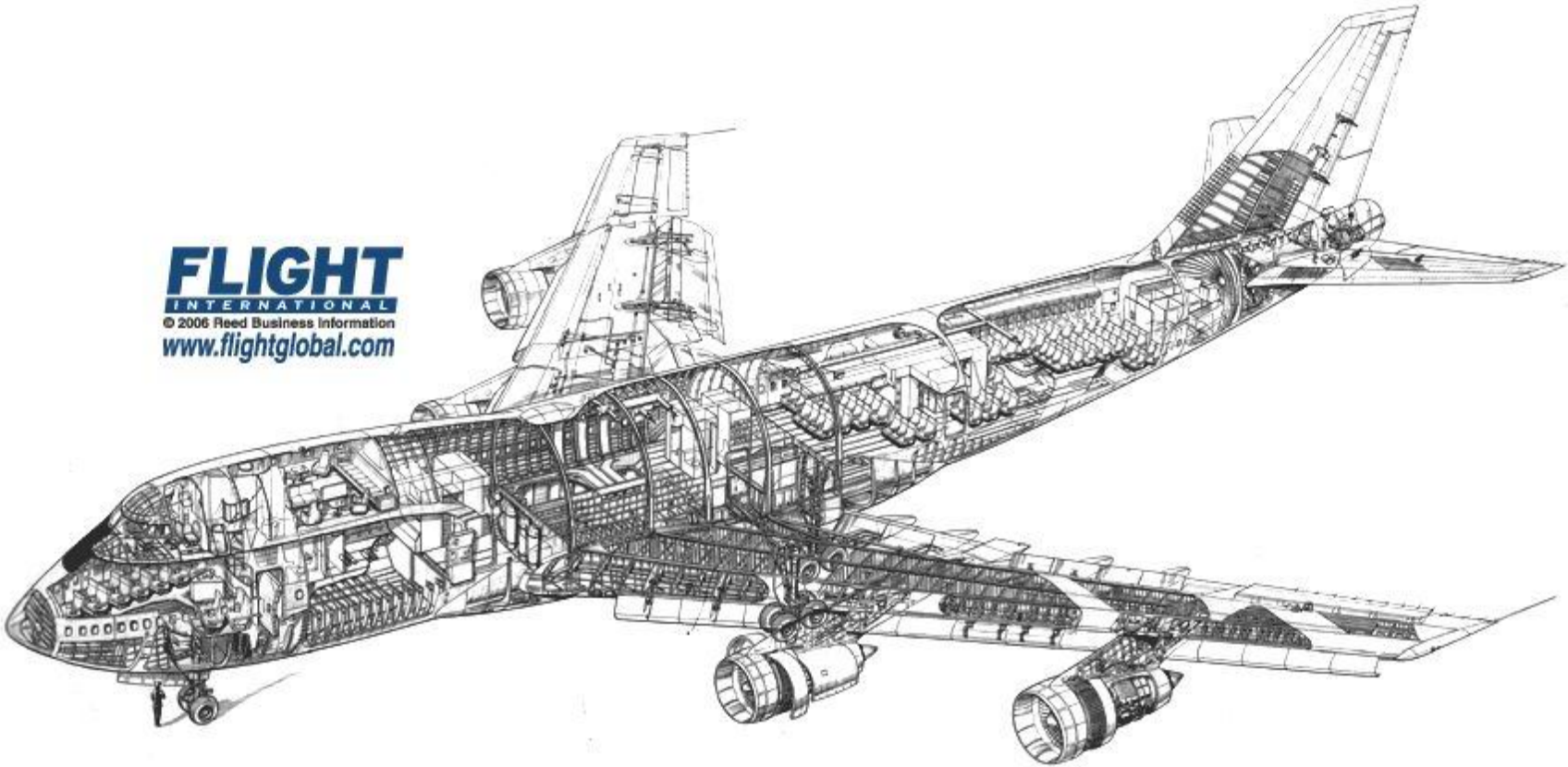
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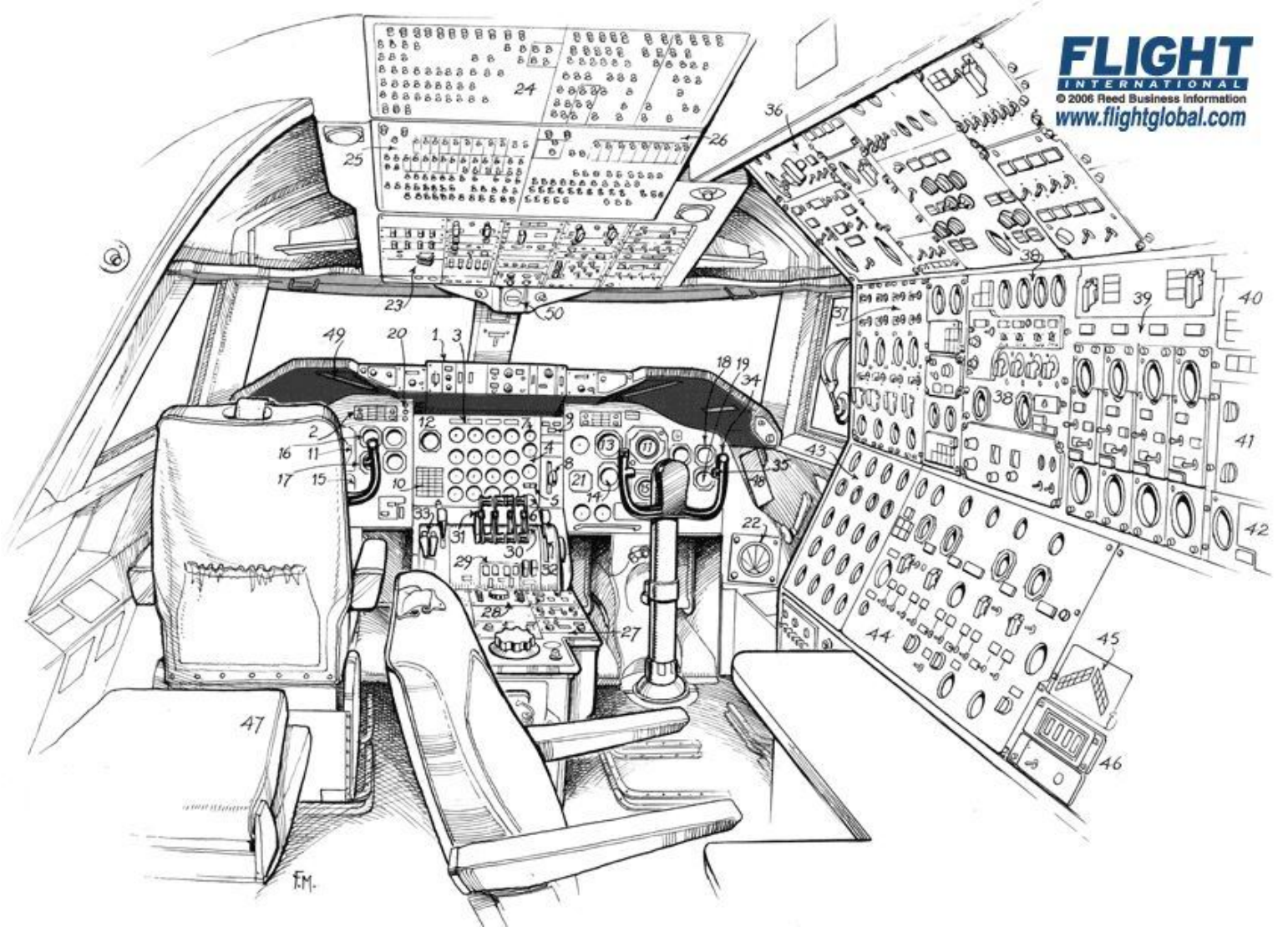


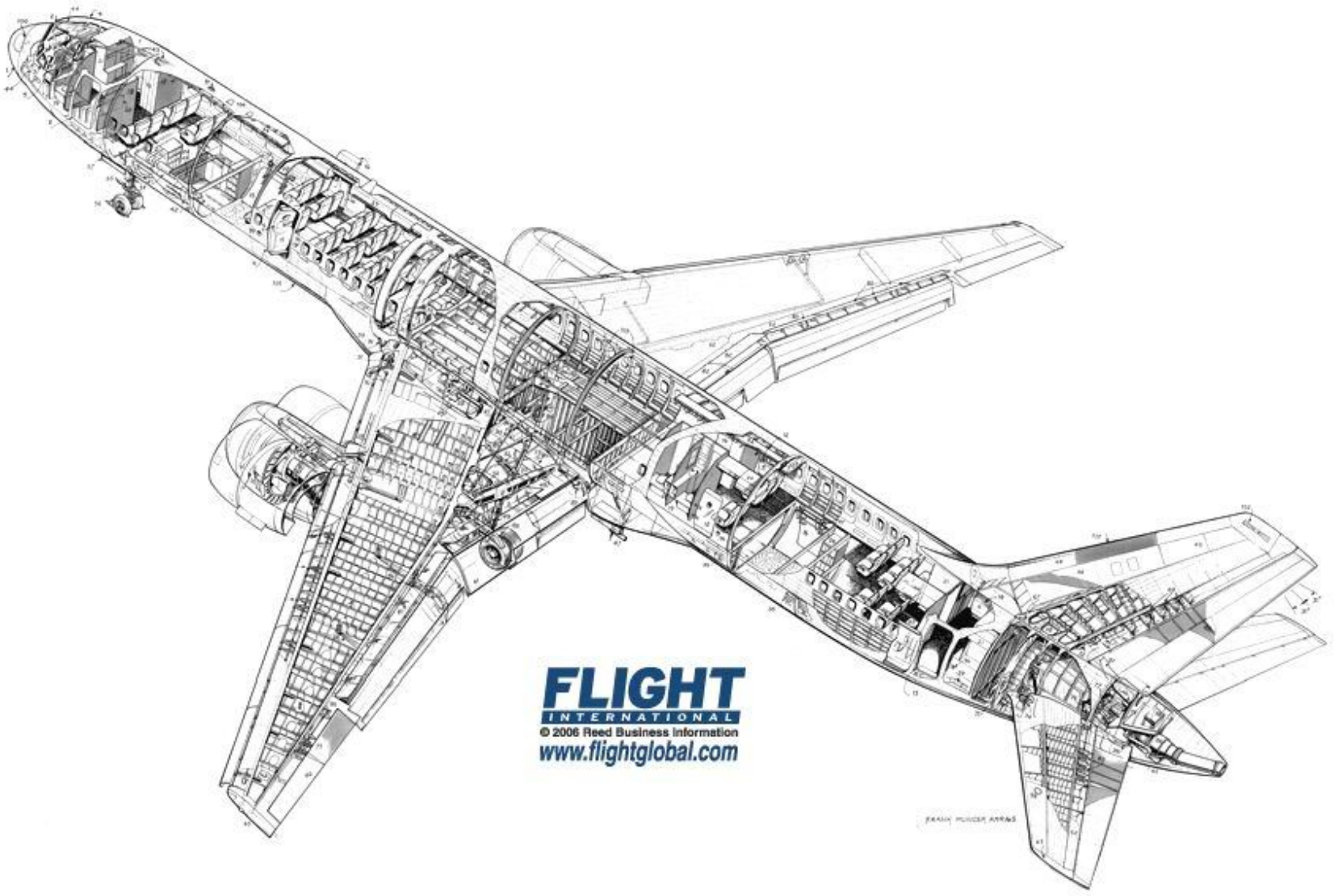
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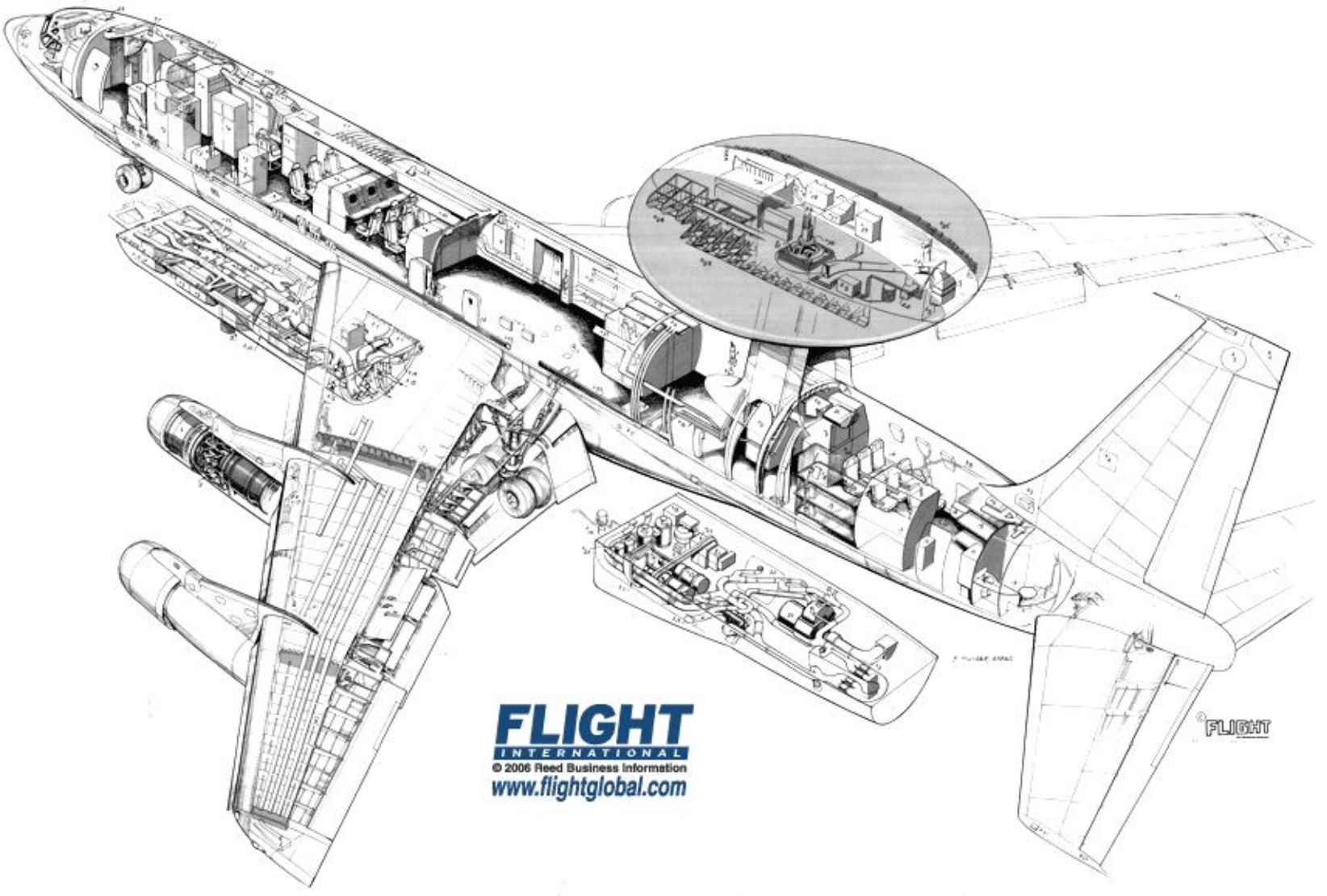


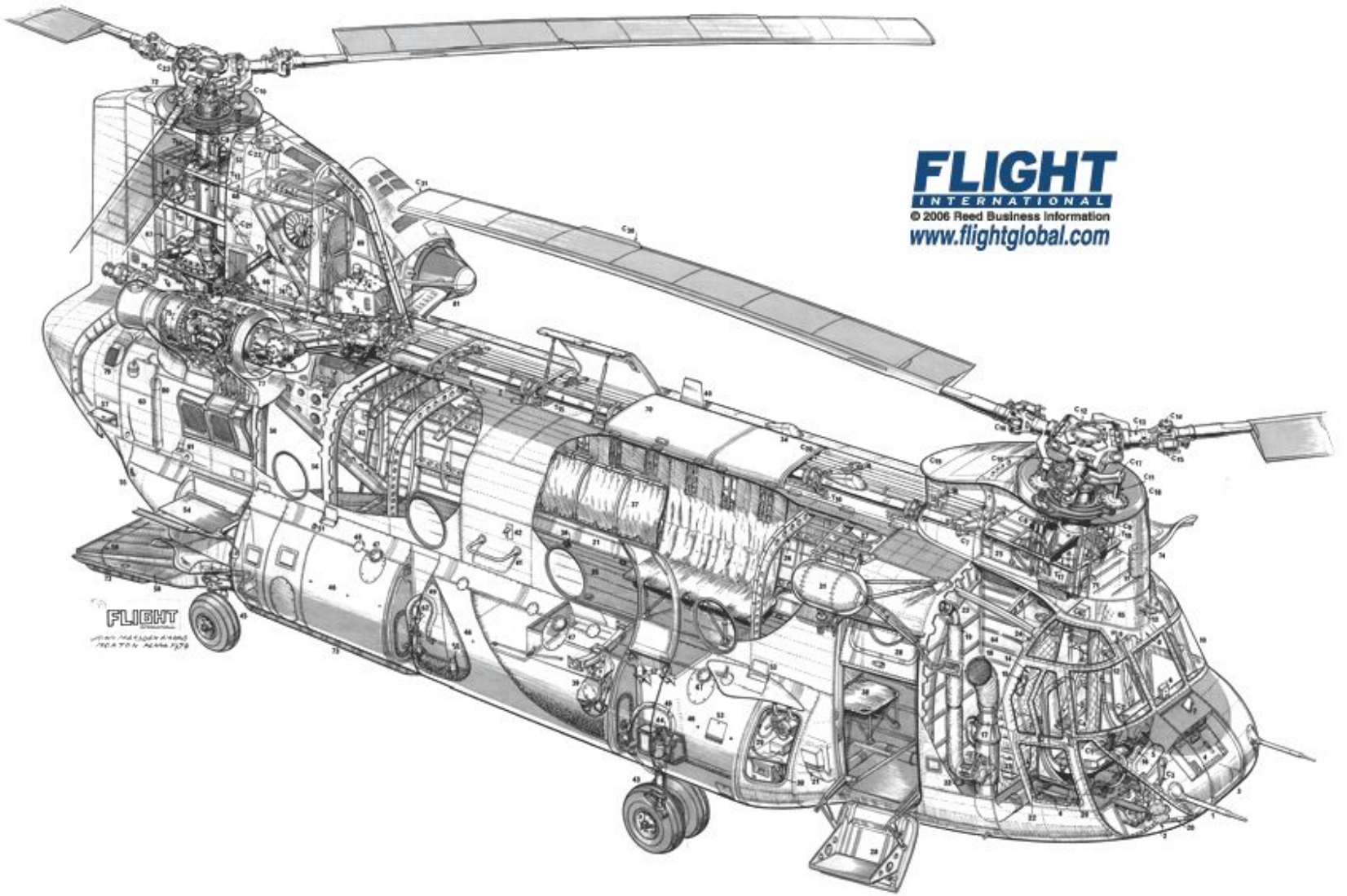
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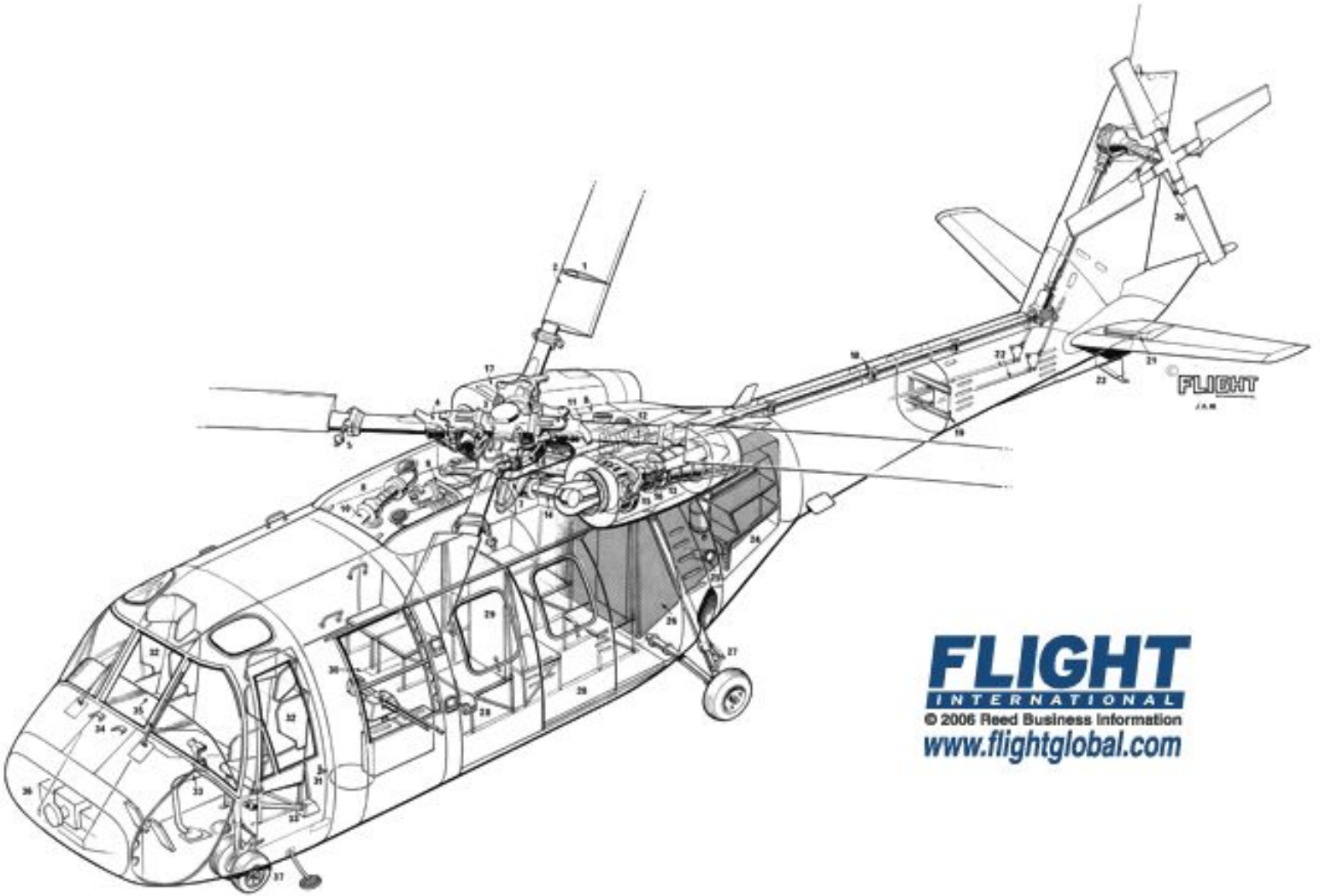

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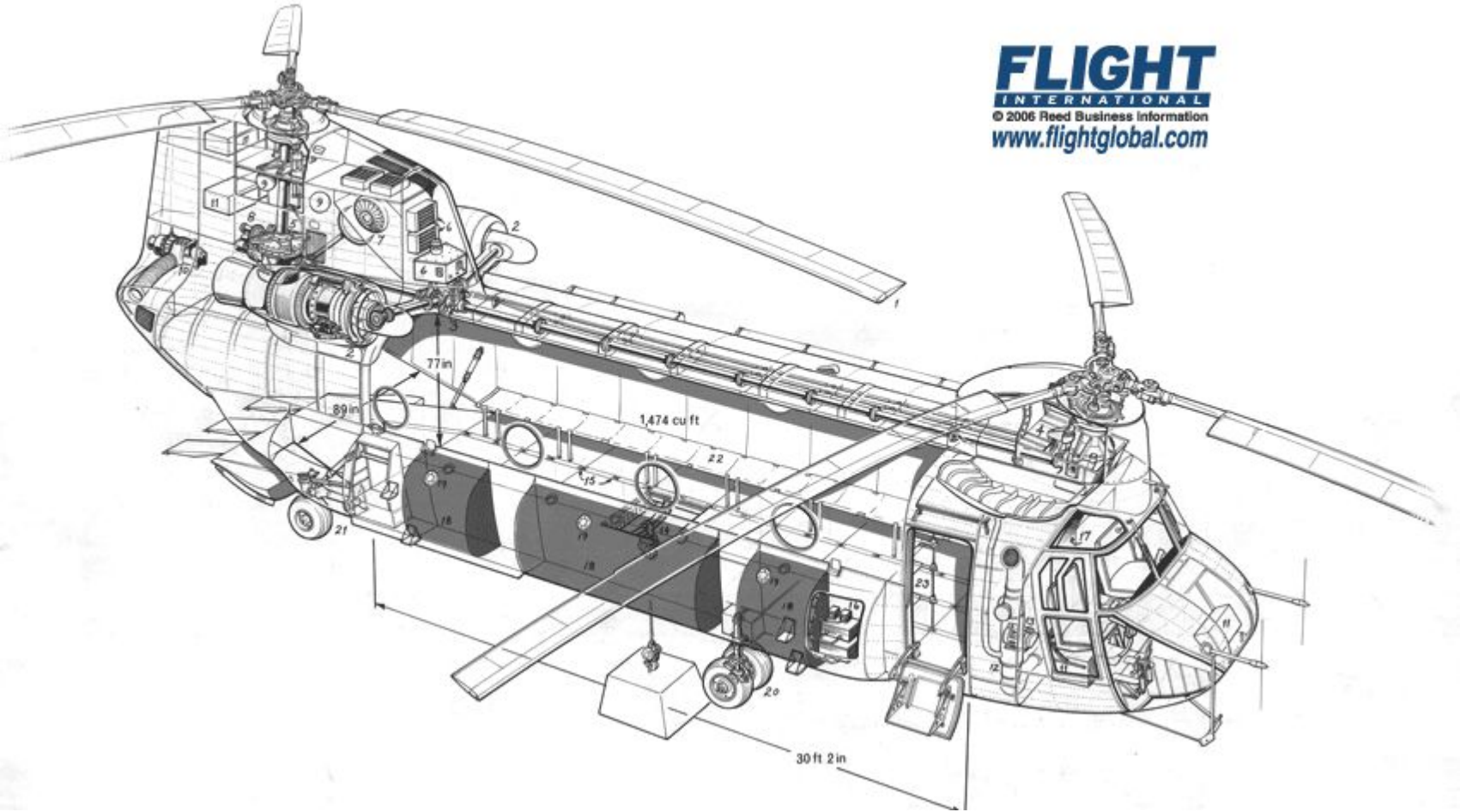

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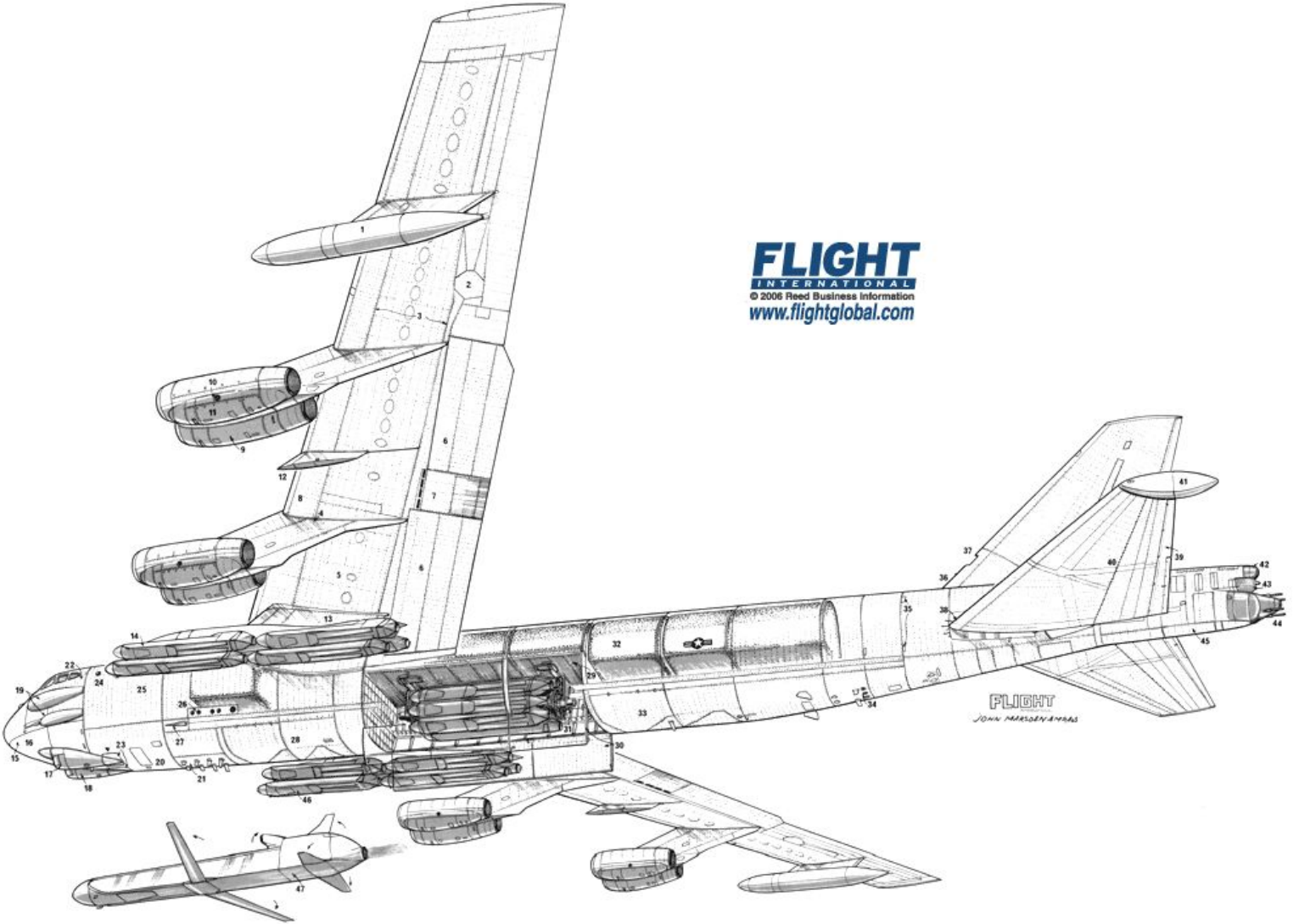

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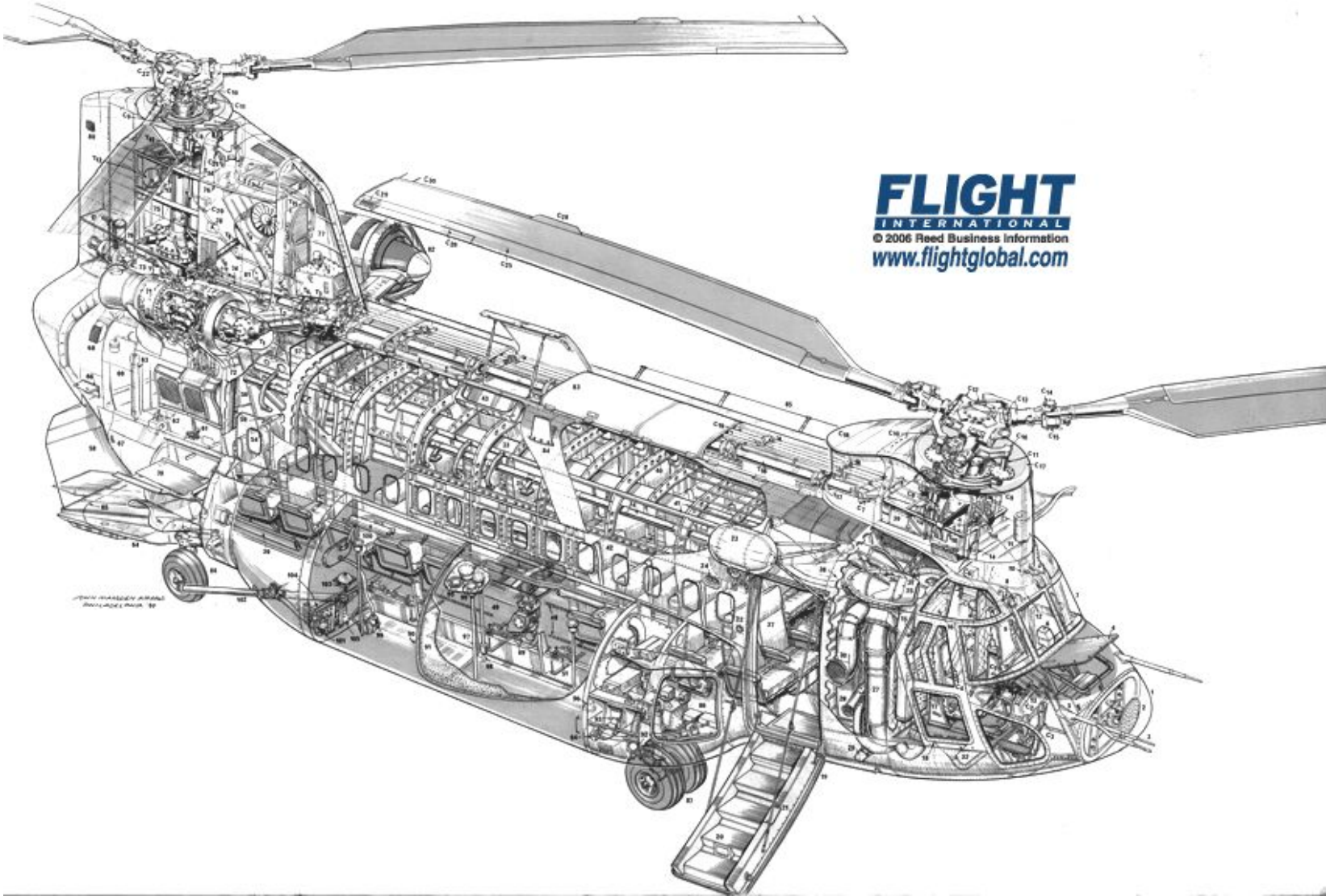


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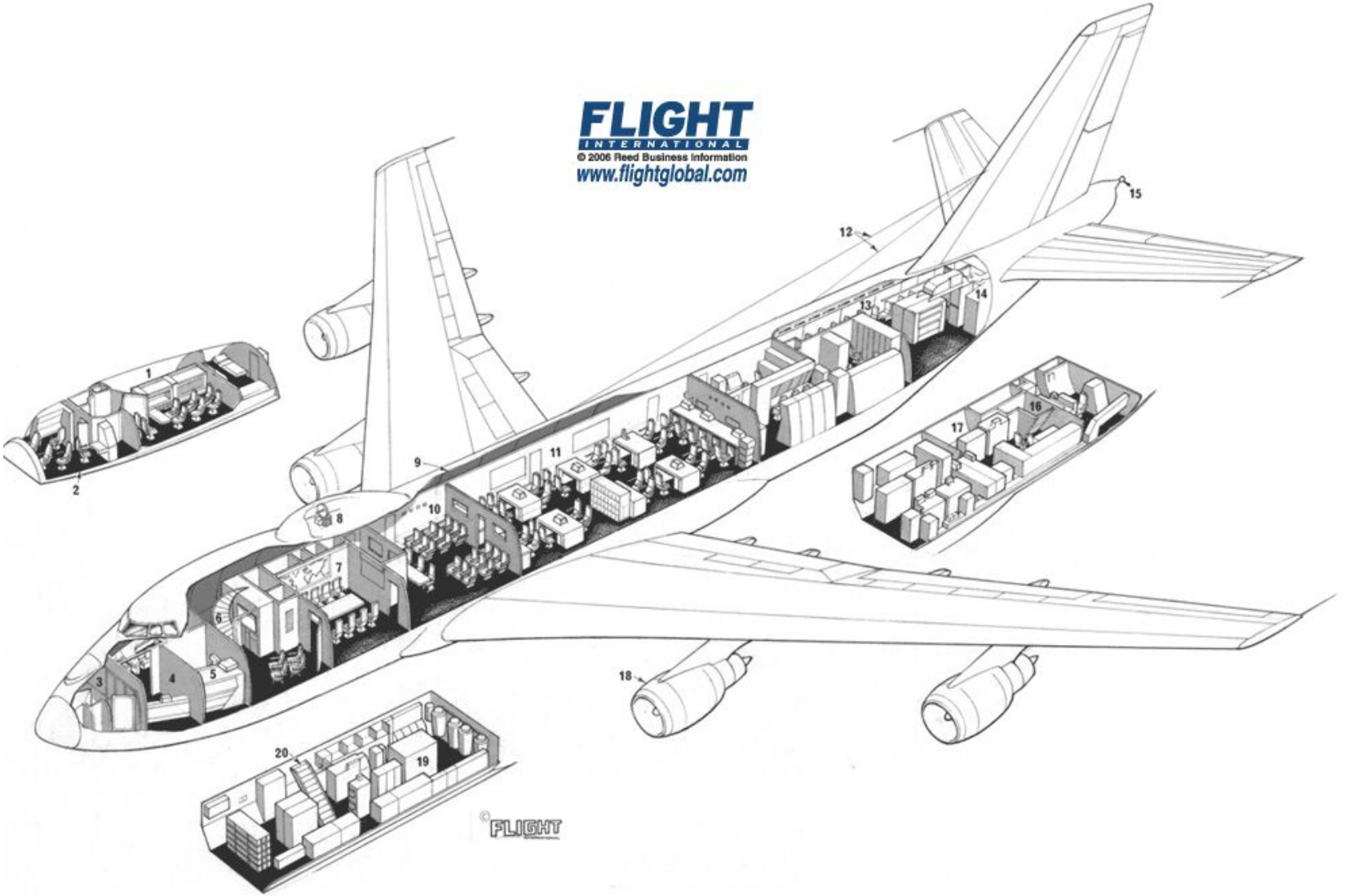


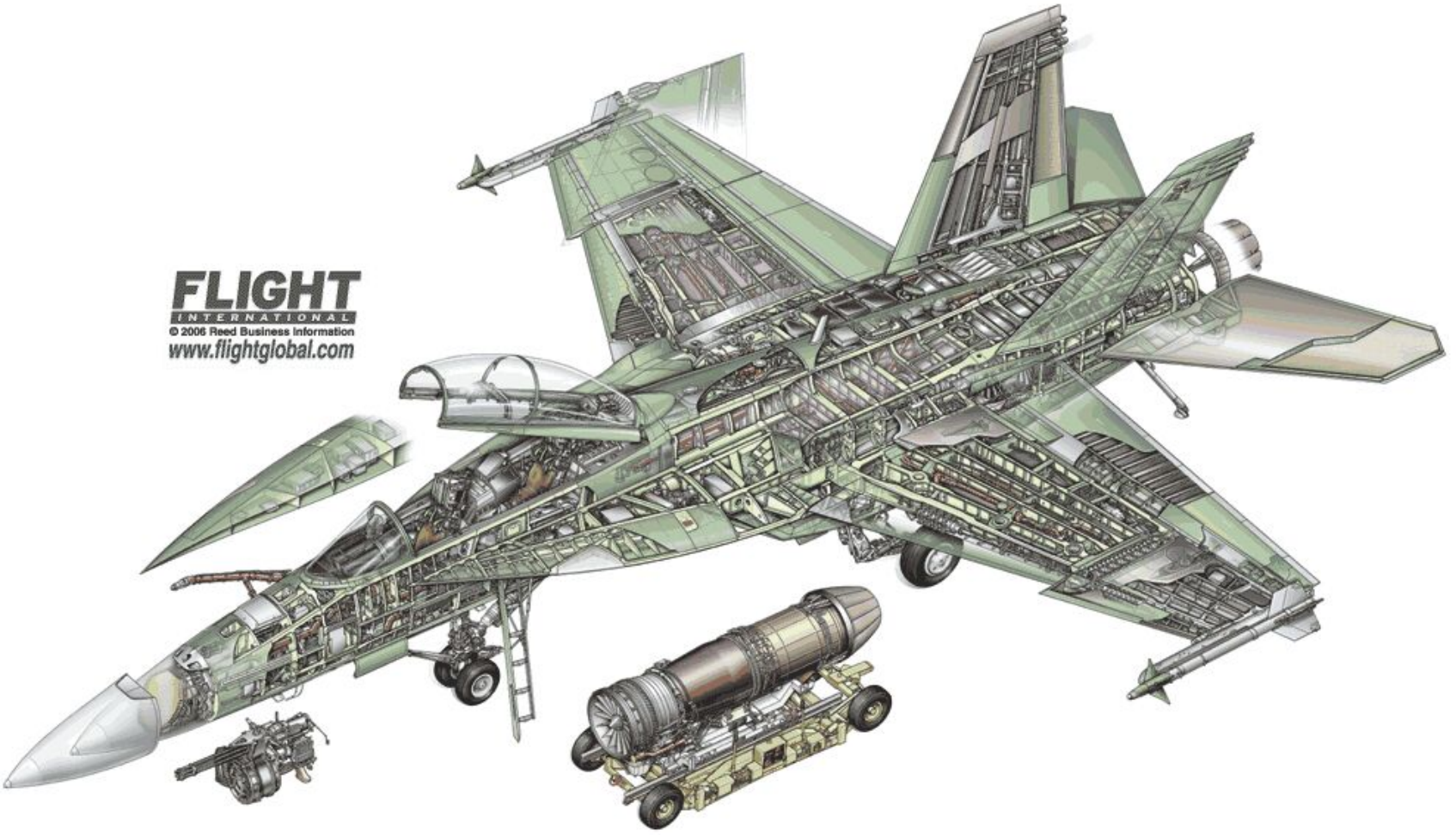
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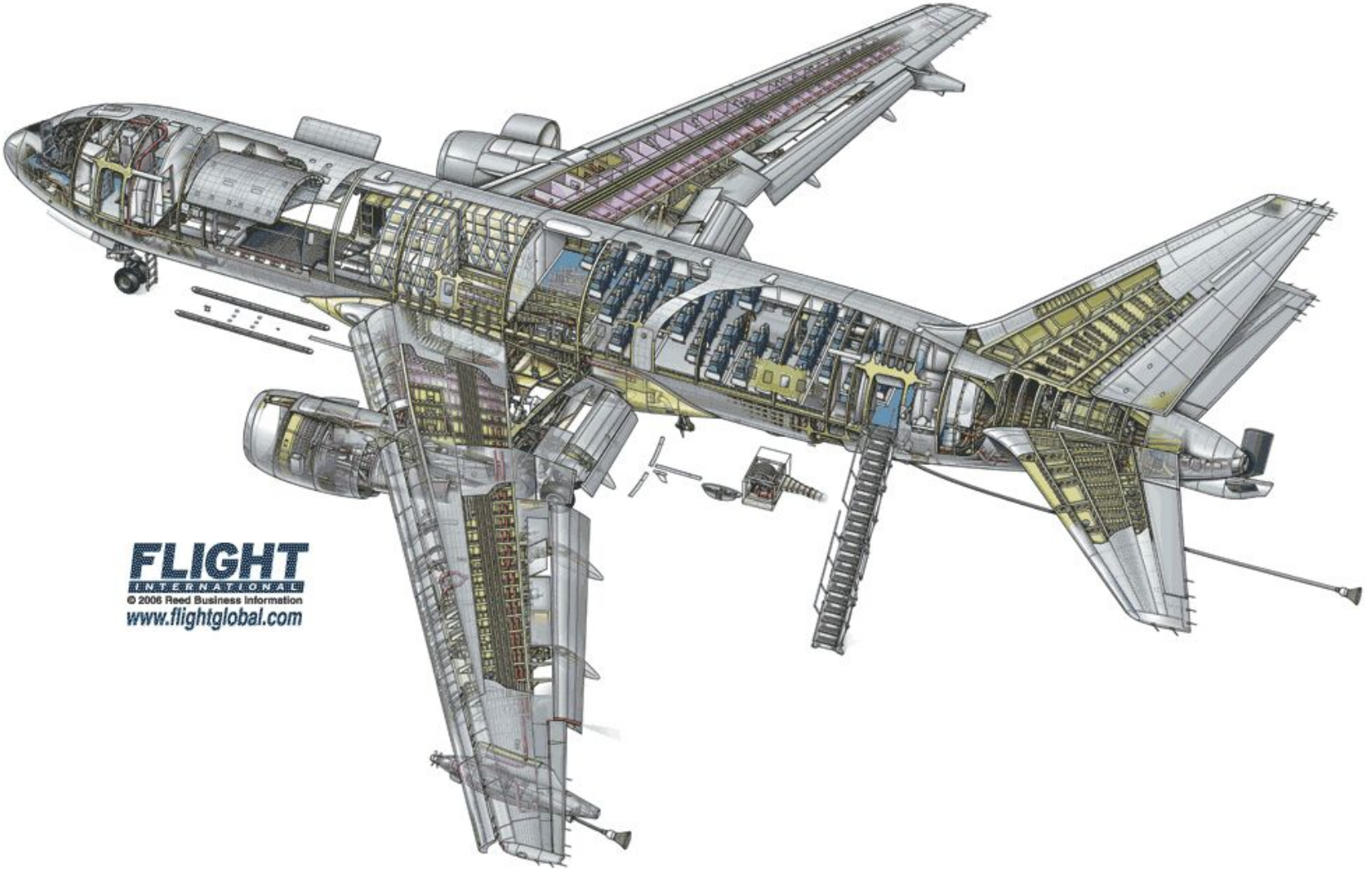

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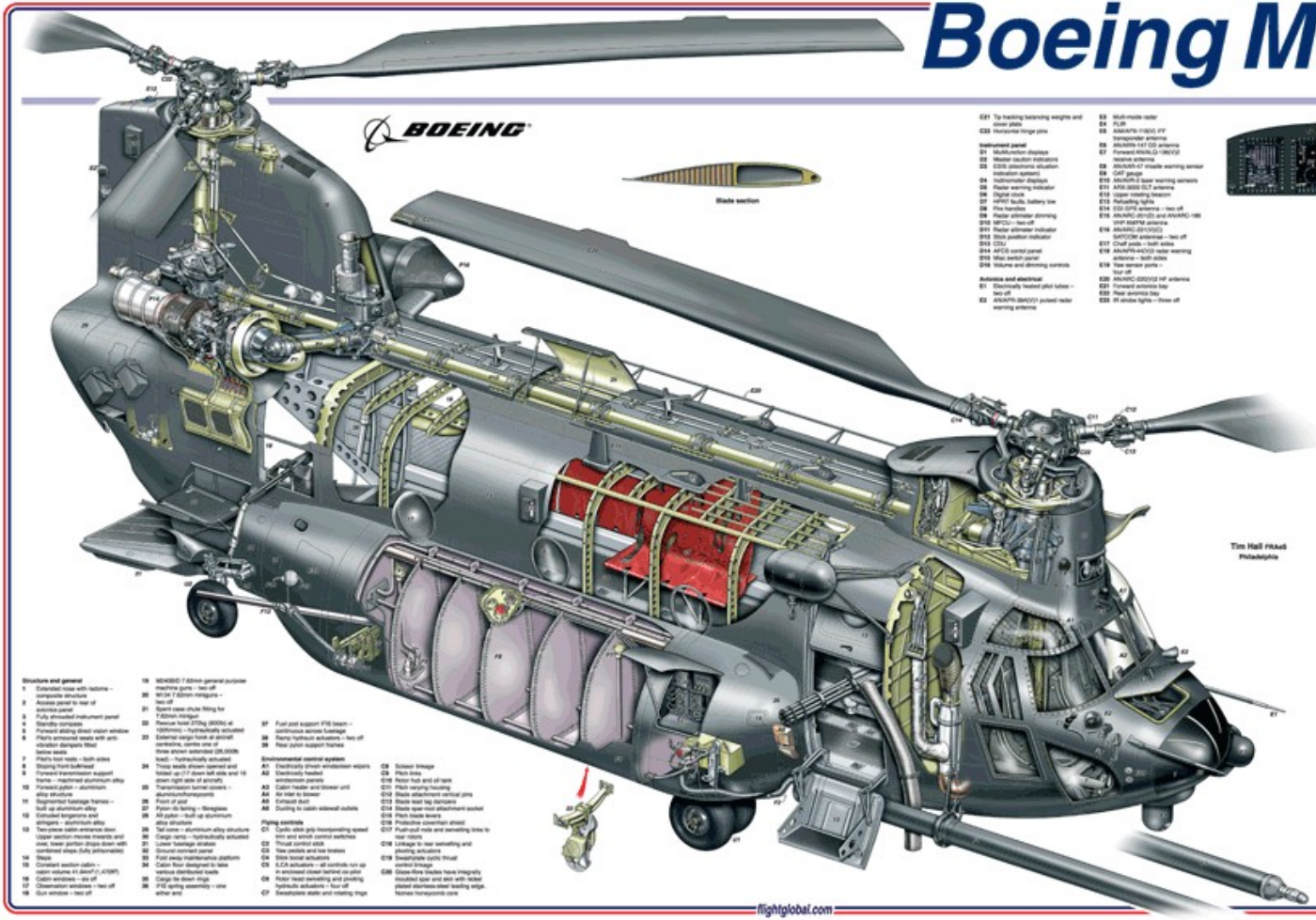
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Boeing MH-47G



Blade section



Instrument panel and central console

Tim Hall FRAeS
Philadelphia

Structure and general
1 Extended nose with radome – composite structure
2 Access panel to rear of avionics panel
3 Fully shrouded instrument panel
4 Standby compass
5 Forward sliding direct vision window
6 Pilot's armoured seats with anti-vibration dampers fitted below seats
7 Pilot's foot rests – both sides
8 Sloping front bulkhead
9 Forward transmission support frame – machined aluminium alloy
10 Forward pylon – aluminium alloy structure
11 Segmented fuselage frames – built up aluminium alloy
12 Extruded longerons and stringers – aluminium alloy
13 Two-piece cabin entrance door: Upper section moves inwards and over, lower portion drops down with combined steps (fully jettisonable)
14 Steps
15 Constant section cabin – cabin volume 41.6mm³ (1,470ft³)
16 Cabin windows – six off
17 Observation windows – two off
18 Gun window – two off
19 M240D/D 7.62mm general purpose machine guns – two off
20 M134 7.62mm miniguns – two off
21 Spent case chute fitting for 7.62mm minigun
22 Rescue hoist (270kg (600lb) at 100ft/min) – hydraulically actuated
23 External cargo hook at aircraft centreline, centre one of three shown extended (26,000lb load) – hydraulically actuated
24 Troop seats shown opened and folded up (17 down left side and 16 down right side of aircraft)
25 Transmission tunnel covers – aluminium/honeycomb
26 Front of pod
27 Pylon rib fairing – fibreglass
28 Aft pylon – built up aluminium alloy structure
29 Tail cone – aluminium alloy structure
30 Cargo ramp – hydraulically actuated
31 Lower fuselage strakes
32 Ground connect panel
33 Fold away maintenance platform
34 Cabin floor designed to take various distributed loads
35 Cargo tie down rings
36 FTE spring assembly – one either end
37 Fuel pod support FTE beam – continuous across fuselage
38 Ramp hydraulic actuators – two off
39 Rear pylon support frames

Environmental control system
A1 Electrically driven windscreen wipers
A2 Electrically heated windscreen panels
A3 Cabin heater and blower unit
A4 Air inlet to blower
A5 Exhaust duct
A6 Ducting to cabin sidewall outlets

Flying controls
C1 Cyclic stick grip incorporating speed trim and winch control switches
C2 Thrust control stick
C3 Yaw pedals and toe brakes
C4 Stick bonet actuators
C5 ILCA actuators – all controls run up in enclosed closet behind co-pilot
C6 Rotor head swivelling and pivoting hydraulic actuators – four off
C7 Swashplate static and rotating rings
C8 Scissor linkage
C9 Pitch links
C10 Rotor hub and oil tank
C11 Pitch varying housing
C12 Blade attachment vertical pins
C13 Blade lead lag dampers
C14 Blade spar-root attachment socket
C15 Pitch horde levers
C16 Protective coverhash shield
C17 Push-pull rods and swivelling links to rear rotors
C18 Linkage to rear swivelling and pivoting actuators
C19 Swashplate cyclic thrust control linkage
C20 Glass-fibre blades have integrally moulded spar and skin with nickel plated stainless-steel leading edge. Nomex honeycomb core
C21 Tip tracking balancing weights and cover plate
C22 Horizontal hinge pins

Instrument panel
D1 Multifunction displays
D2 Master caution indicators
D3 EGIS (electronic situation indication system)
D4 Inclinometer displays
D5 Radar warning indicator
D6 Digital clock
D7 HF/FC faults, battery low
D8 Fire handles
D9 Radar altimeter dimming
D10 MFCU – two off
D11 Radar altimeter indicator
D12 Stick position indicator
D13 CDU
D14 AFCS control panel
D15 Misc switch panel
D16 Volume and dimming controls

Avionics and electrical
E1 Electrically heated pitot tubes – two off
E2 AN/APR-39A(V)1 pulsed radar warning antenna
E3 Multi-mode radar
E4 FLIR
E5 AN/APX-118(V) IFF transponder antenna
E6 AN/APN-147 GS antenna
E7 Forward AN/ALQ-136(V)2 receive antenna
E8 AN/AAR-47 missile warning sensor
E9 GAT gauge
E10 AN/AVR-2 laser warning sensors
E11 ARC-220D SLT antenna
E12 Upper rotating beacon
E13 Refuelling lights
E14 CGI GPS antenna – two off
E15 AN/ARC-201(D) and AN/ARC-186 (VHF AM/FM antenna
E16 AN/ARC-201(V)2(C) SATCOM antennae – two off
E17 Chaff pods – both sides
E18 AN/APR-44(V)3 radar warning antenna – both sides
E19 Yaw sensor ports – four off
E20 AN/ARC-220(V)2 HF antenna
E21 Forward antenna bay
E22 Rear antenna bay
E23 IR strobe lights – three off

Fuel system
F1 In flight refuelling probe – length 6.97m
F2 Transfer hose
F3 Fuel transfer manifold
F4 External fuel pods, Kevlar skin with Nomex honeycomb core
F5 Single point pressure refuelling nozzle
F6 Gravity fuel filler
F7 Fuel quantity probes
F8 Internal baffles in fuel cell
F9 Boosters pump – two per tank
F10 Tank venting lines
F11 Fuel jettison valve
F12 Fuel jettison tube – pneumatically extended
F13 Pneumatic reservoir for fuel jettison tube
F14 Fuel jettison bottle pressure gauge
F15 Fuel level control valve
F16 Refuelling control processor

Powerplant and transmission
P1 Engine transmission gearbox
P2 Engine drive torque shaft
P3 Engine combiner gearbox
P4 Combiner gearbox oil tank
P5 Combiner gearbox cooling fan
P6 Synchronising shaft to rear gearbox
P7 Rear transmission gearbox with accessory gearbox on rear face driving hydraulic pump and generator
P8 Vertical drive shaft to rear rotor
P9 Drive shaft thrust bearing
P10 Forward drive-synchronising shaft – seamless aluminium alloy tubes, dynamically balanced
P11 Drive-shaft shrouds absorbing support mountings
P12 Forward transmission gearbox
P13 Honeywell T55-GA-714A engine
P14 Carried tailplate assembly
P15 Engine inlet
P16 Bypass screen assembly
P17 Auxiliary power unit
P18 Rotor brake
P19 Fire suppression system reservoirs

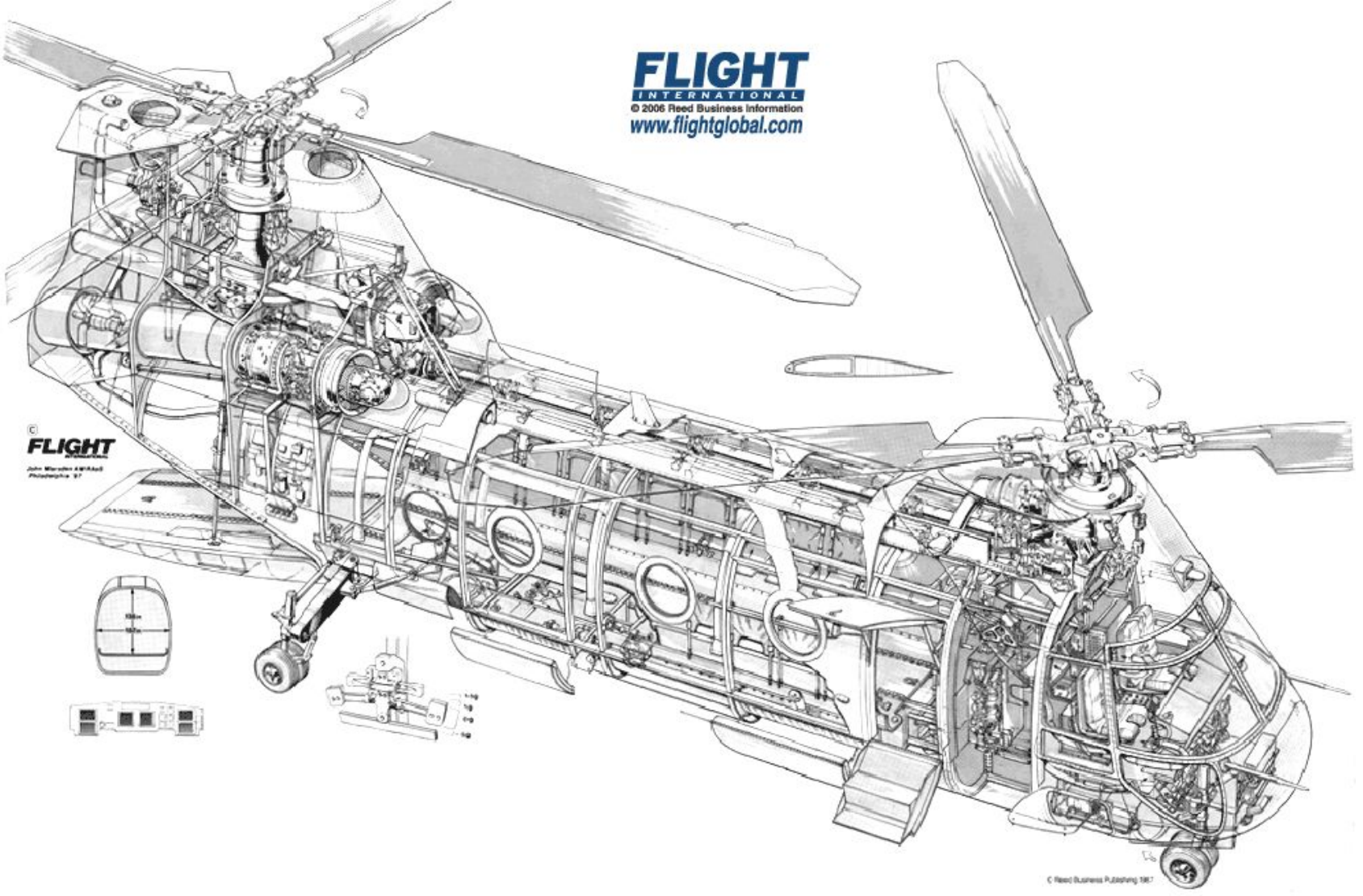
Undercarriage and hydraulics
U1 Front fixed undercarriage with single disc three-pad brake unit
U2 Rear fully steerable undercarriage – steering through 360 degrees on right leg only. Single disc three pad brake unit
U3 EPU/brk pump
U4 Manual utility hydraulic pump

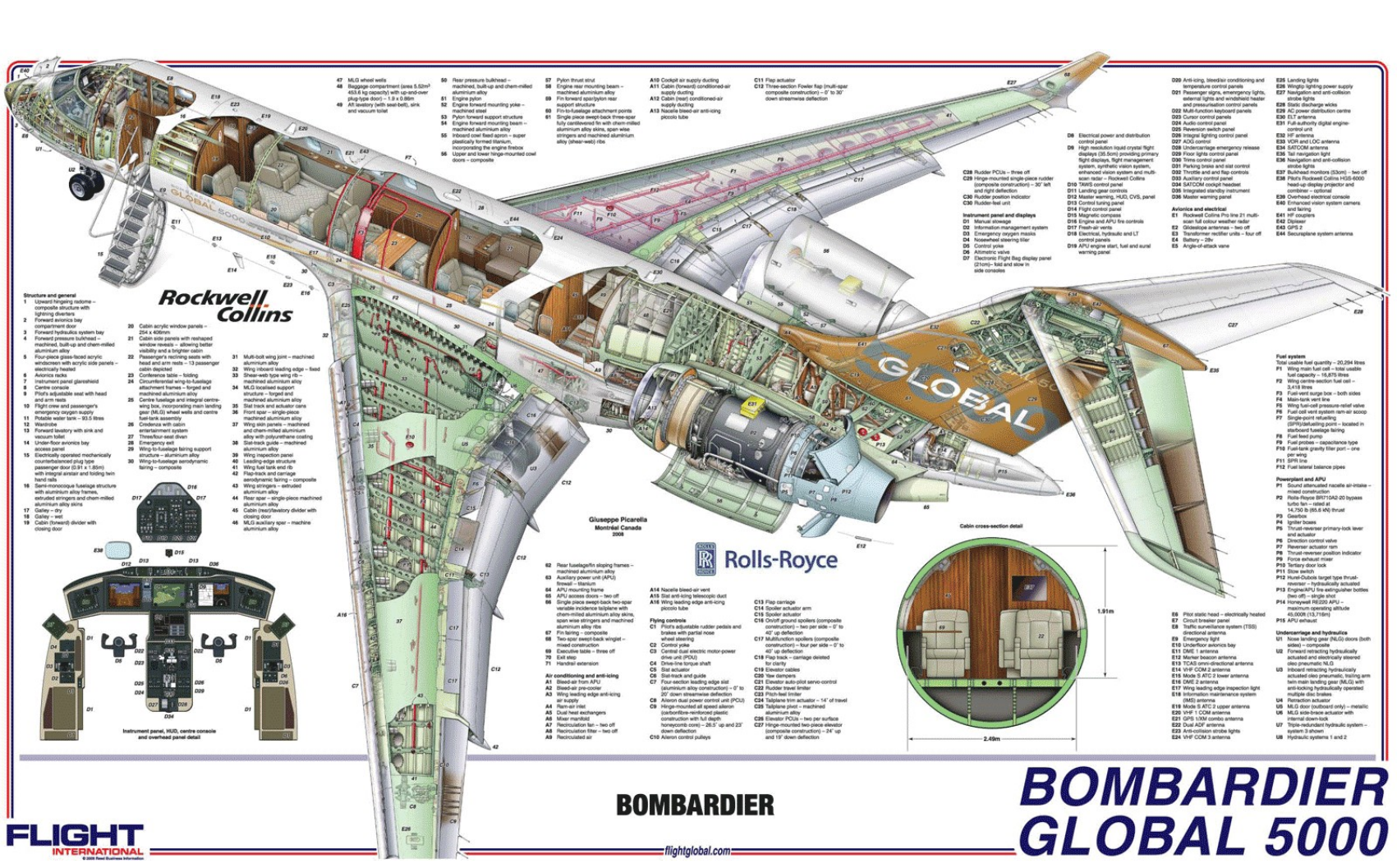
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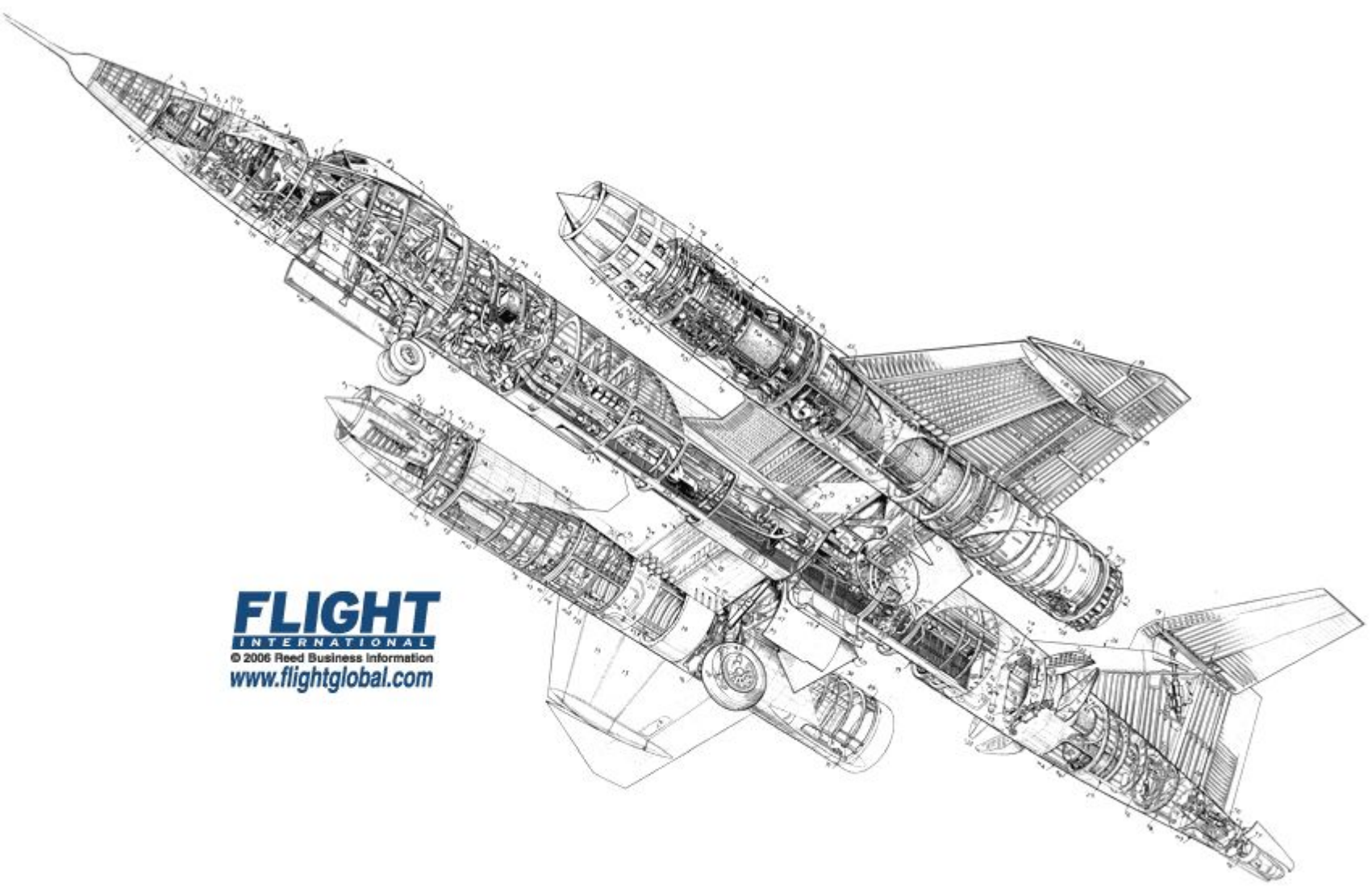




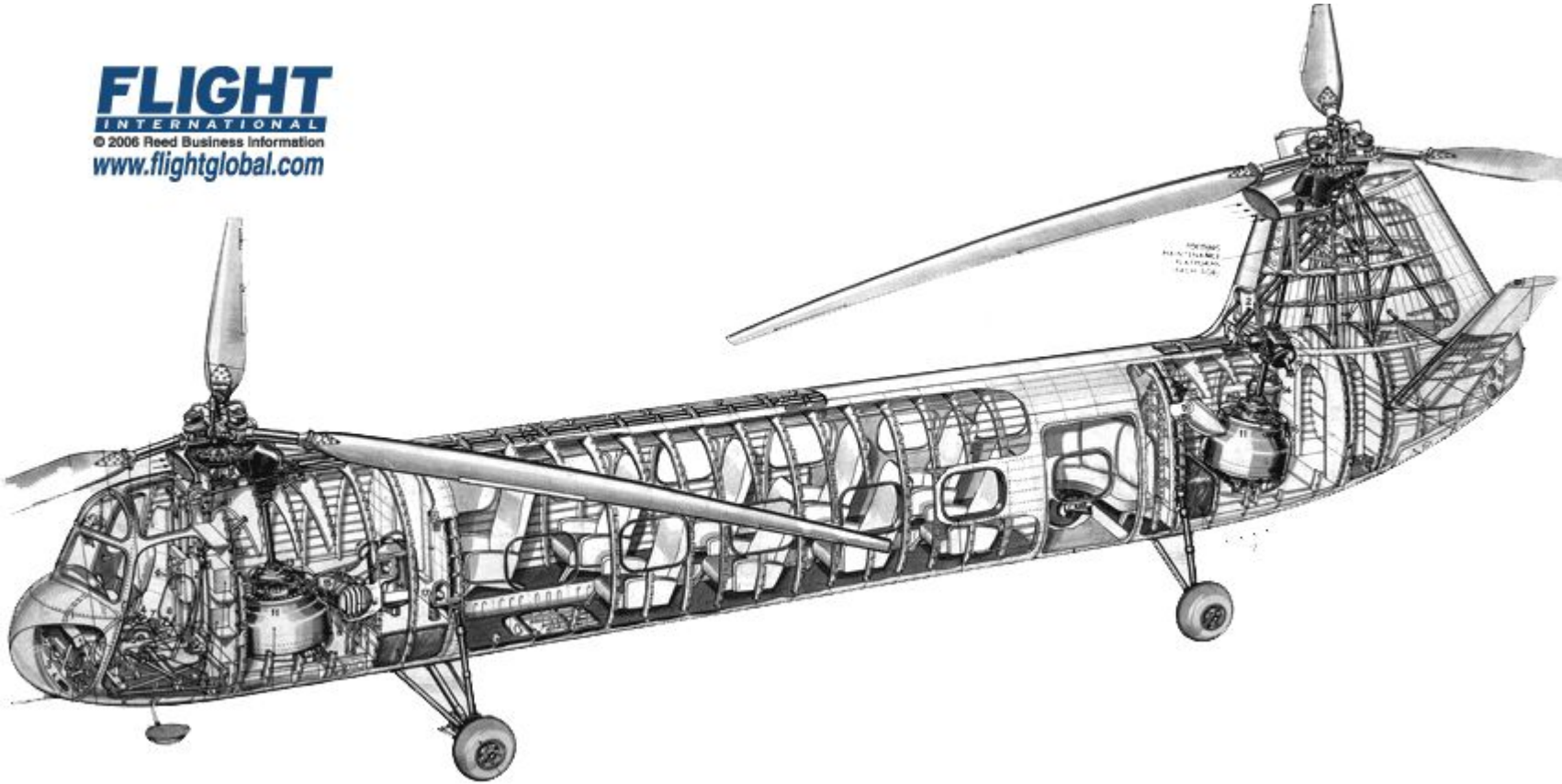
BOMBARDIER GLOBAL 5000

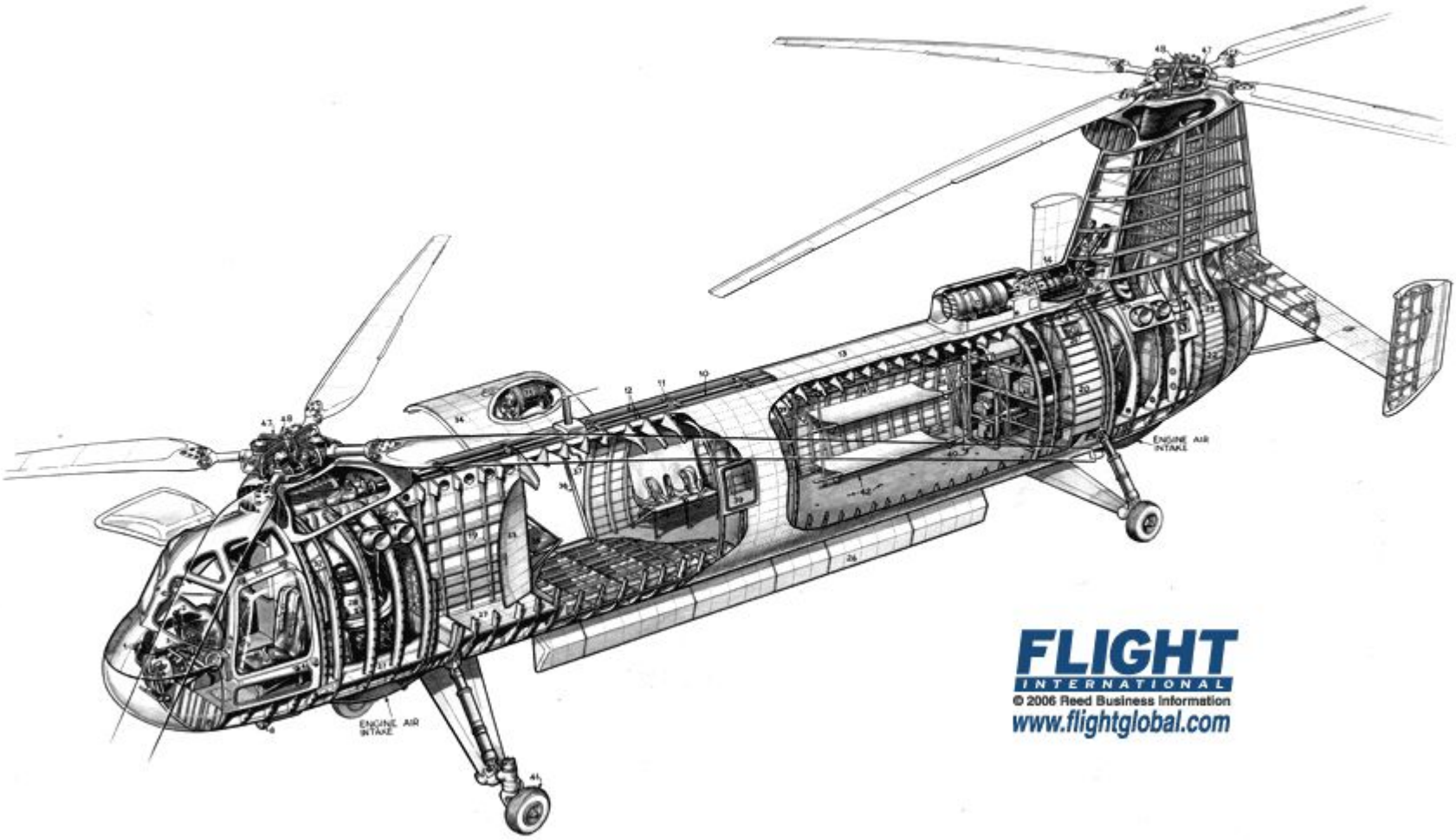
BOMBARDIER

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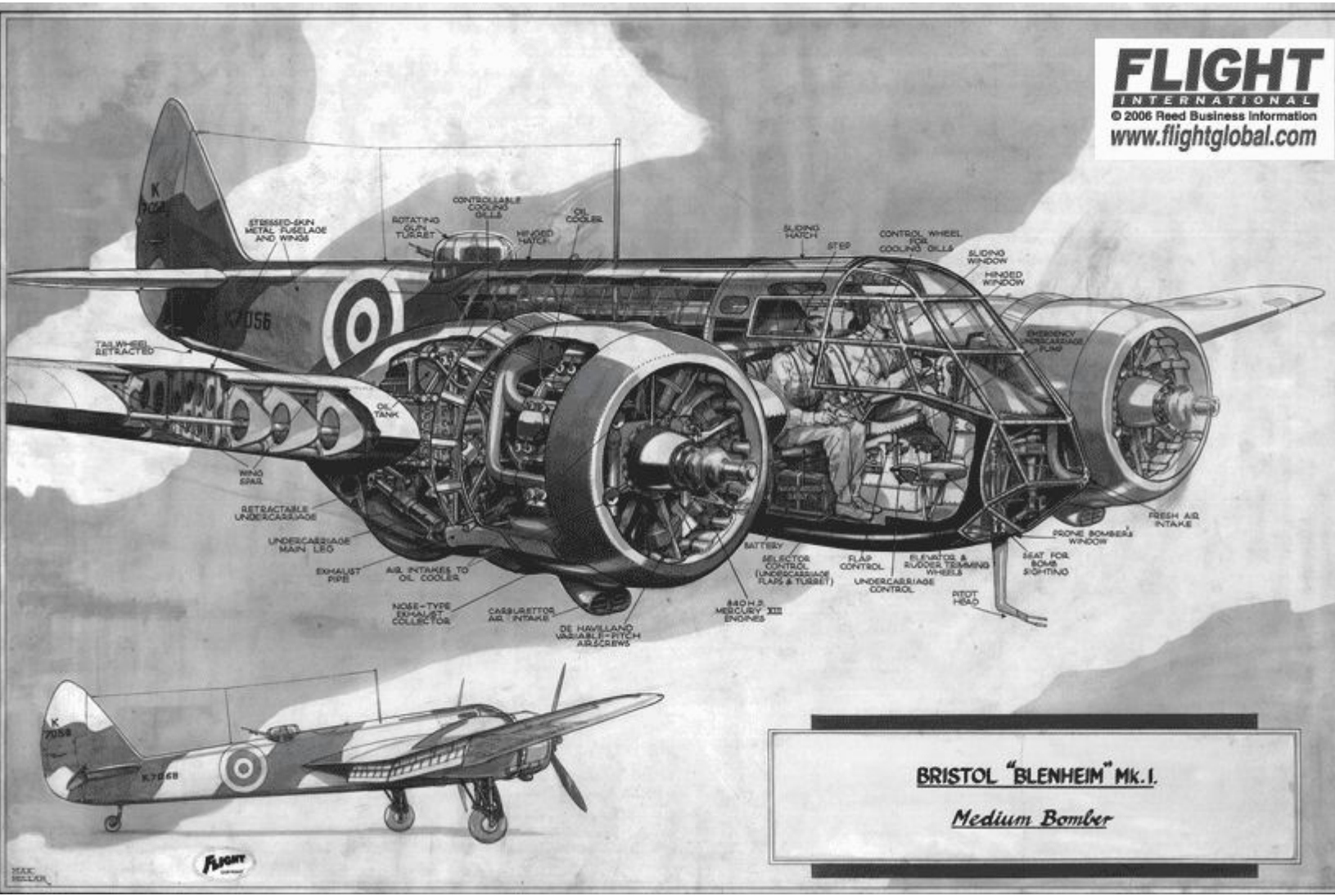


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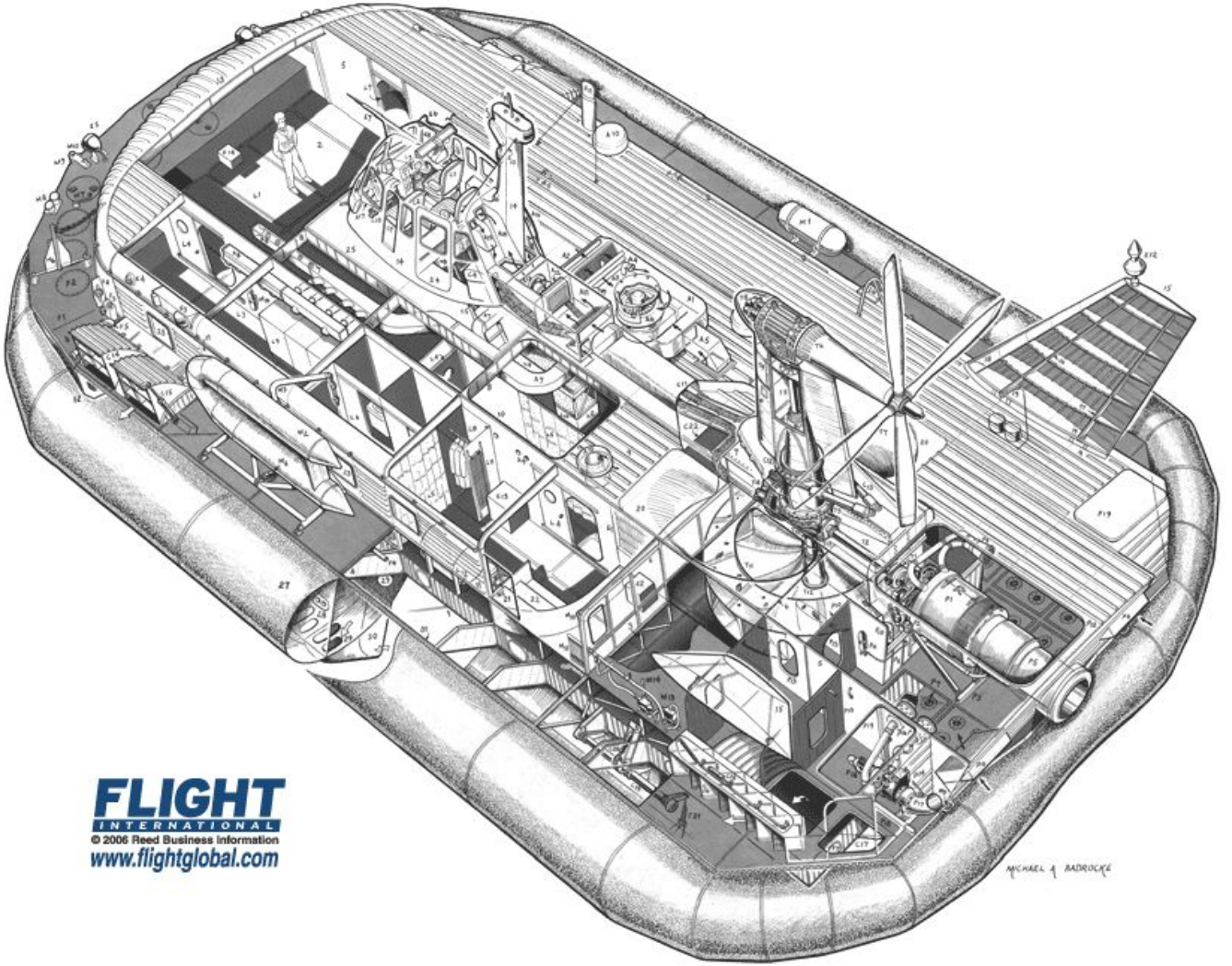
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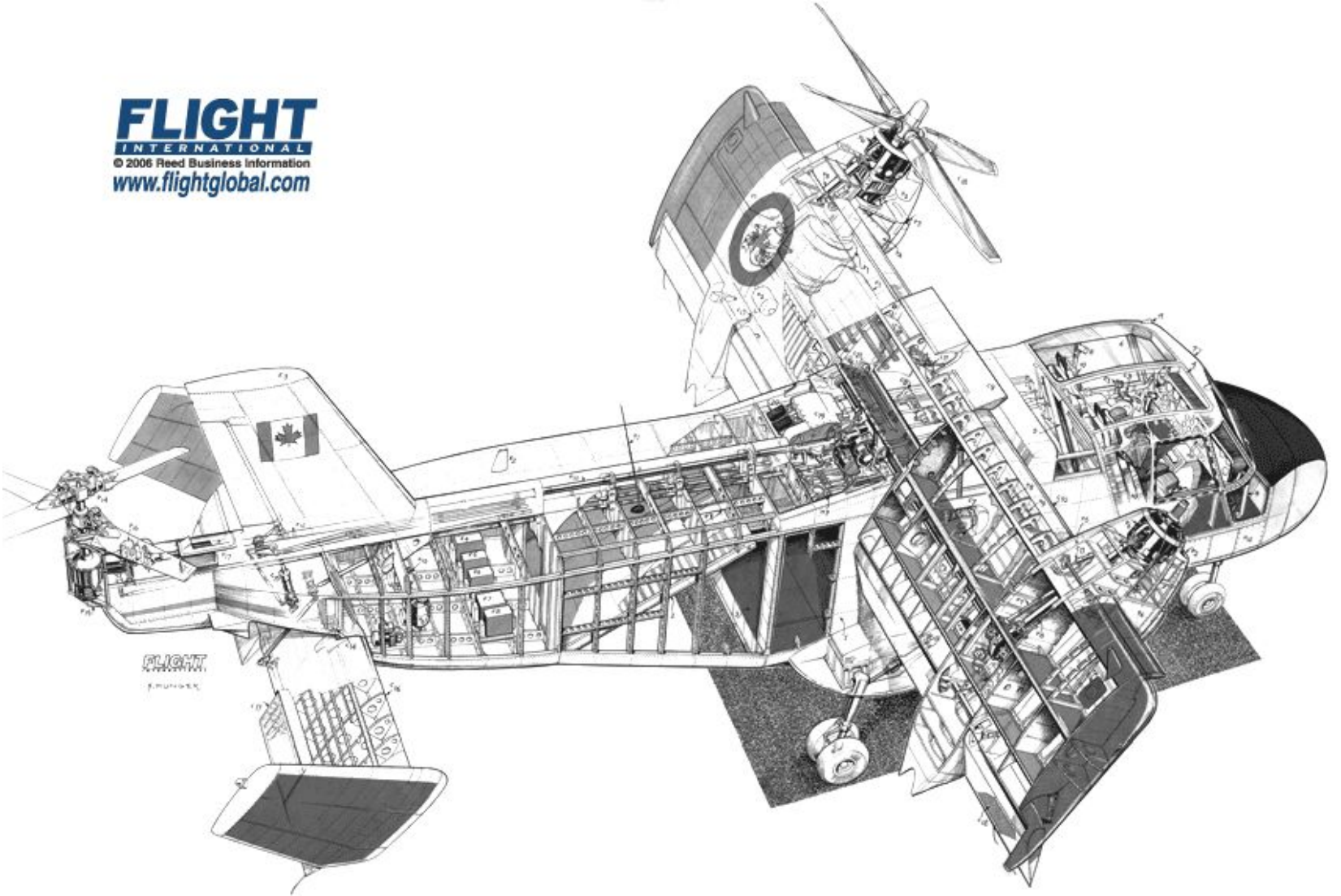


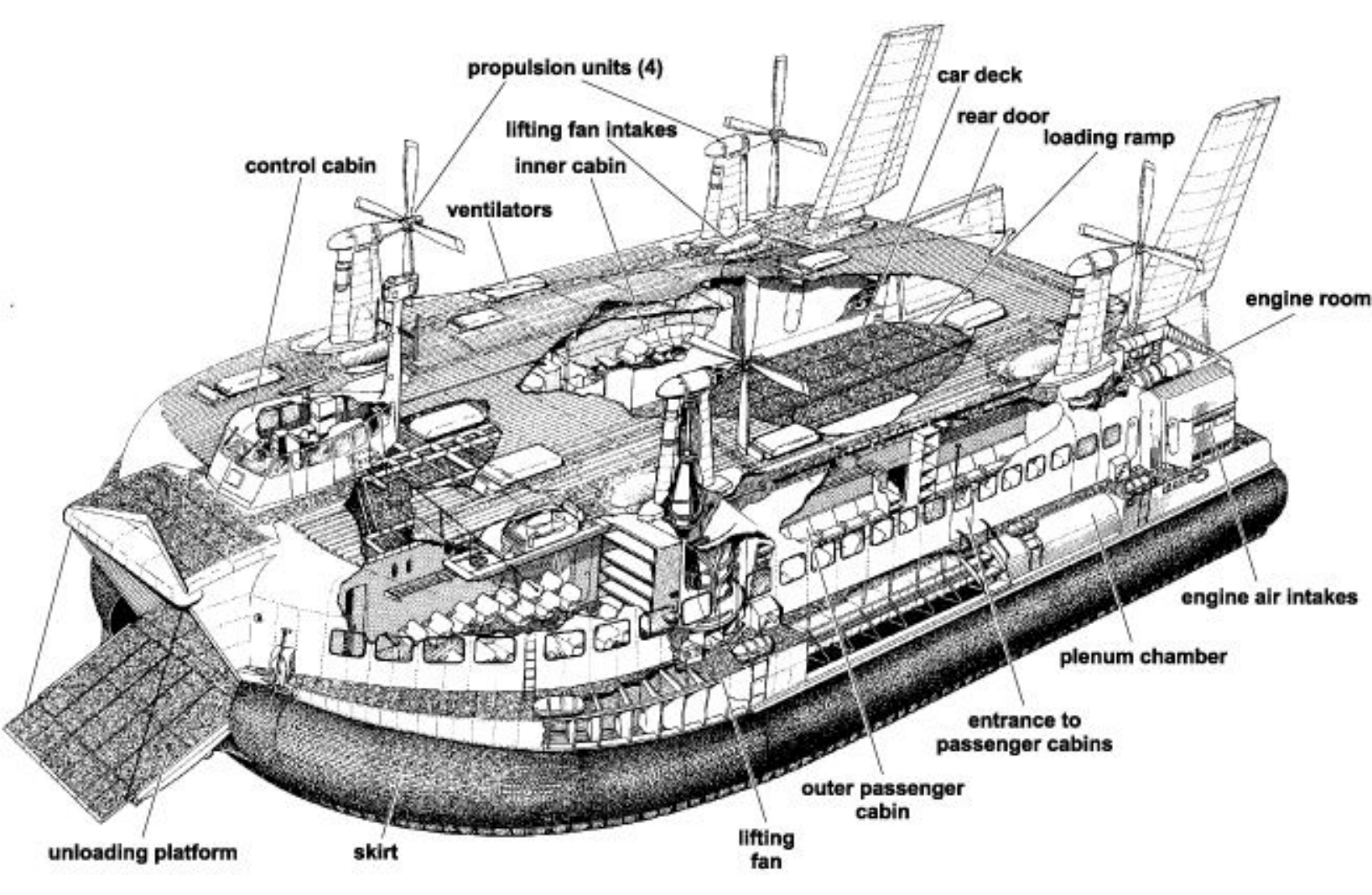
BRISTOL "BLENHEIM" Mk. I.

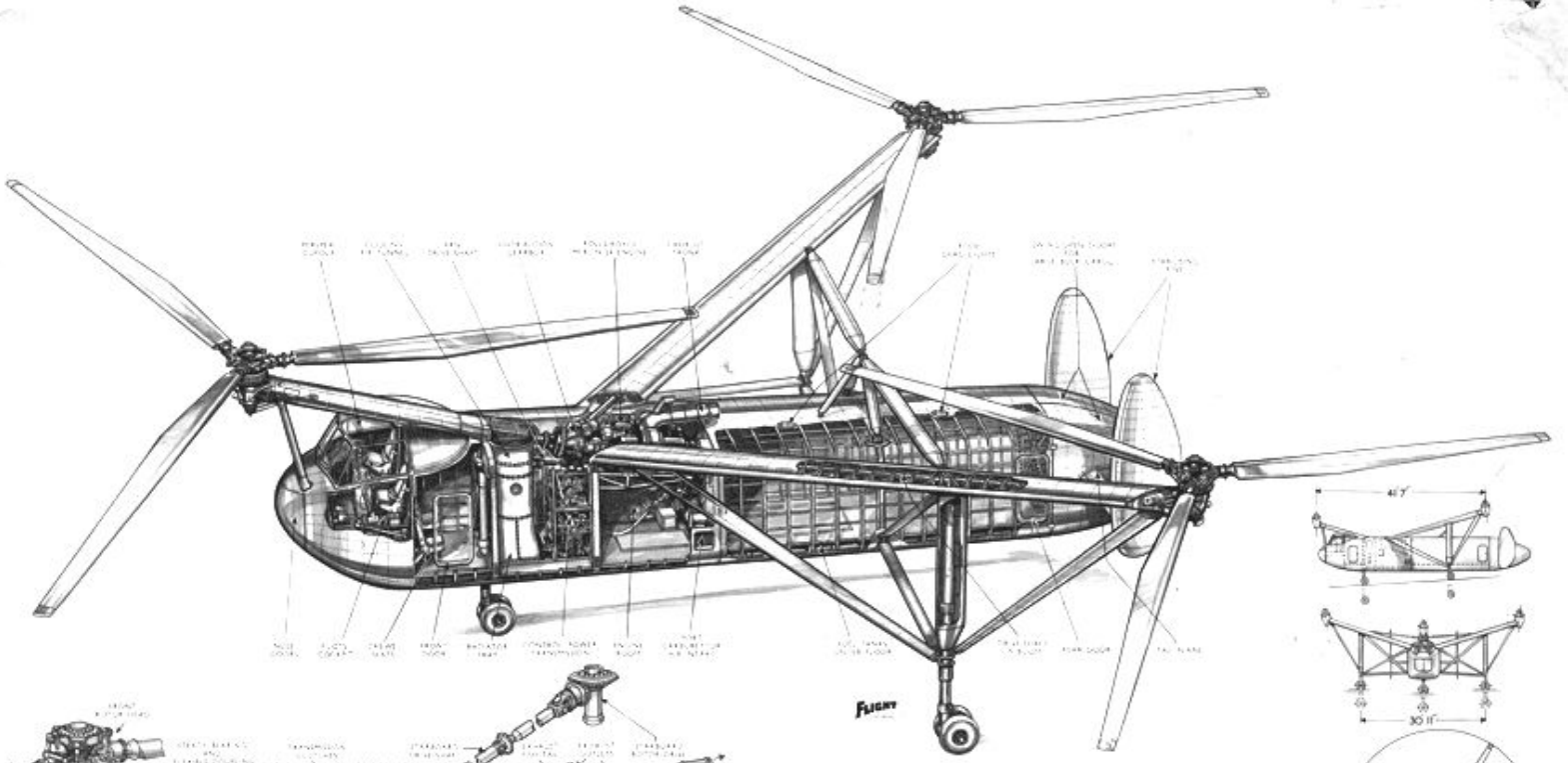
Medium Bomber

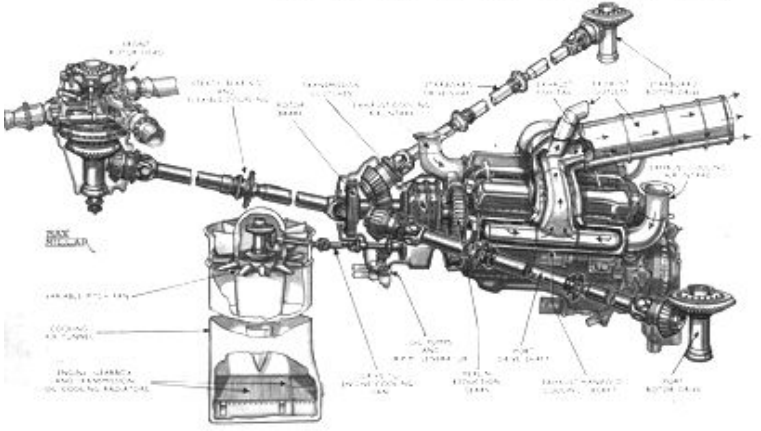

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MICHAEL J. BADROCKE

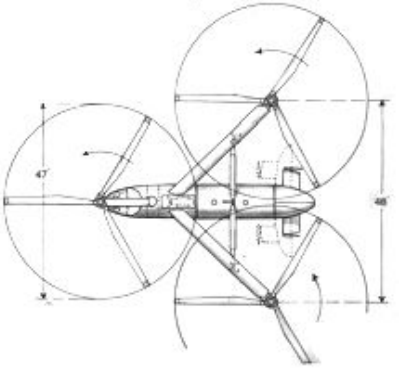
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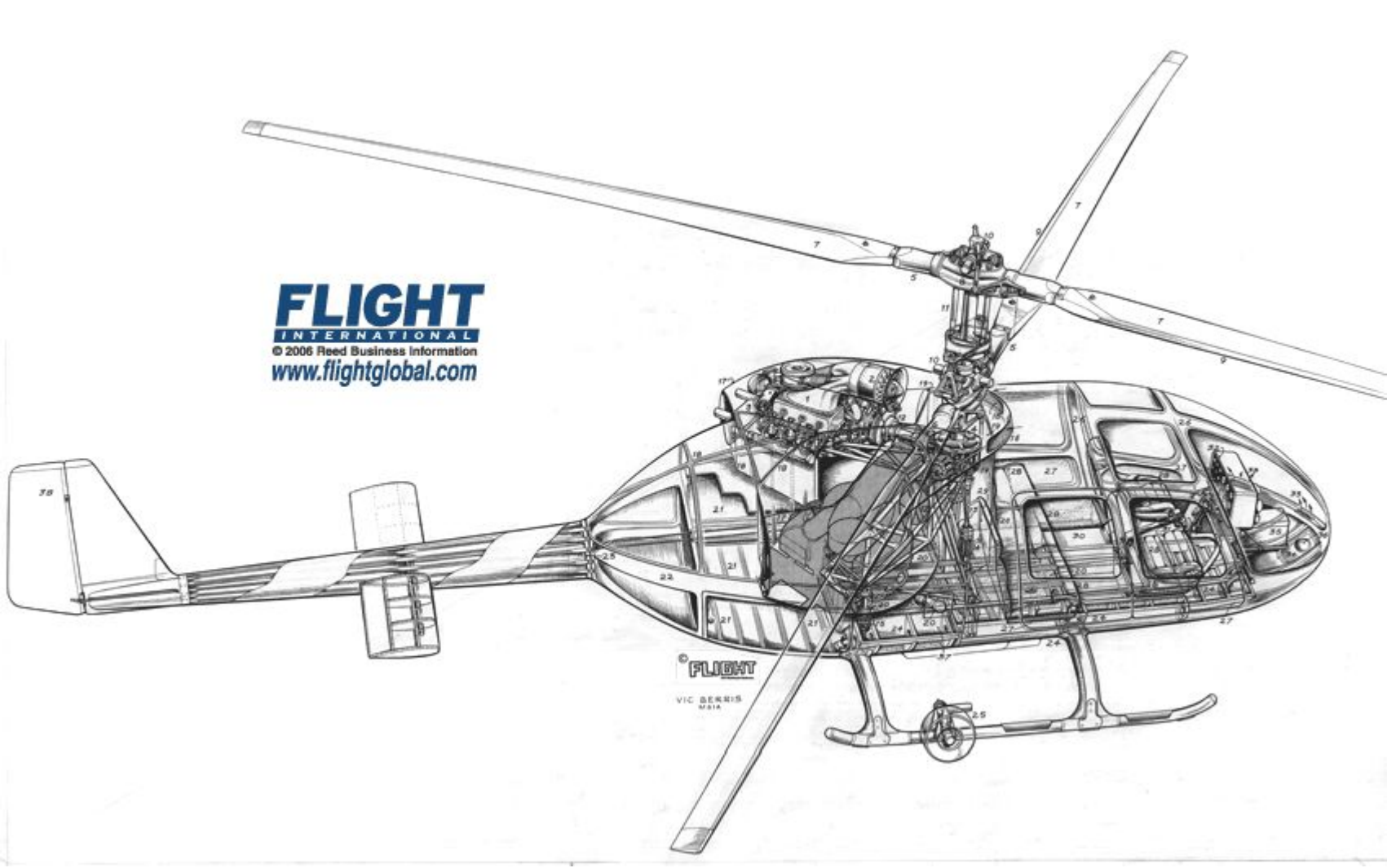

propulsion units (4)
car deck
rear door
loading ramp
lifting fan intakes
control cabin
inner cabin
ventilators
engine room
engine air intakes
plenum chamber
entrance to
passenger cabins
outer passenger
cabin
lifting
fan
skirt
unloading platform

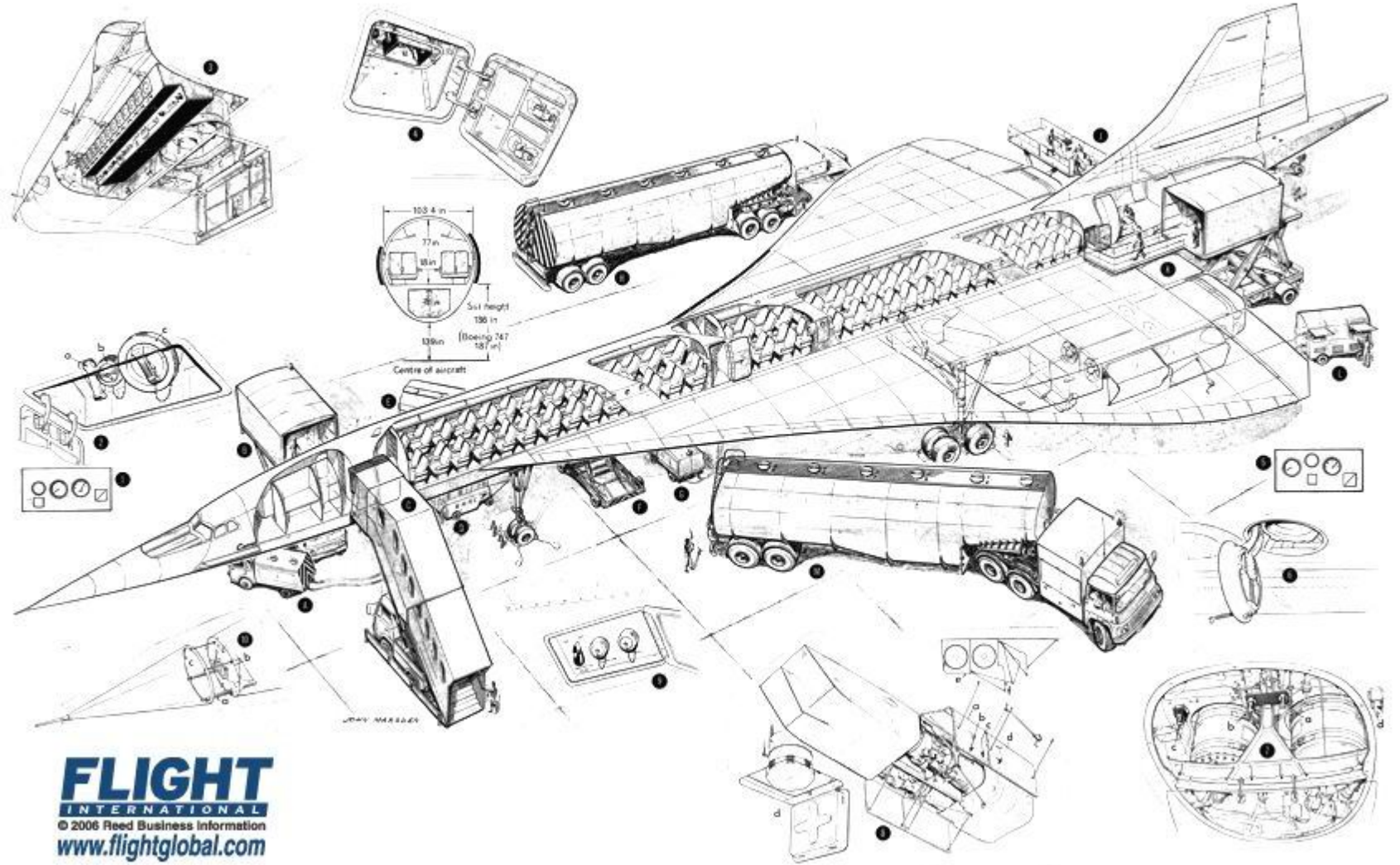




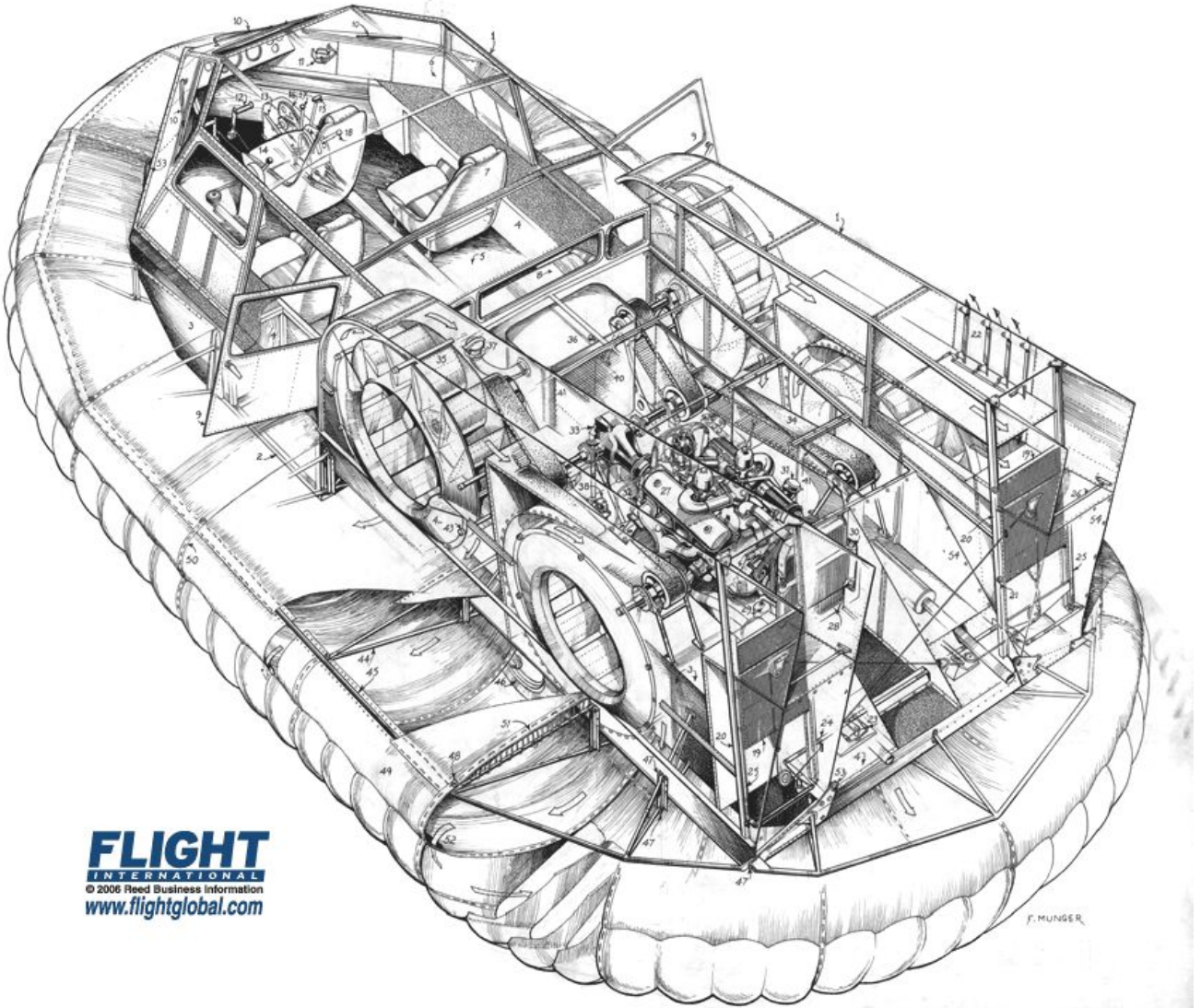


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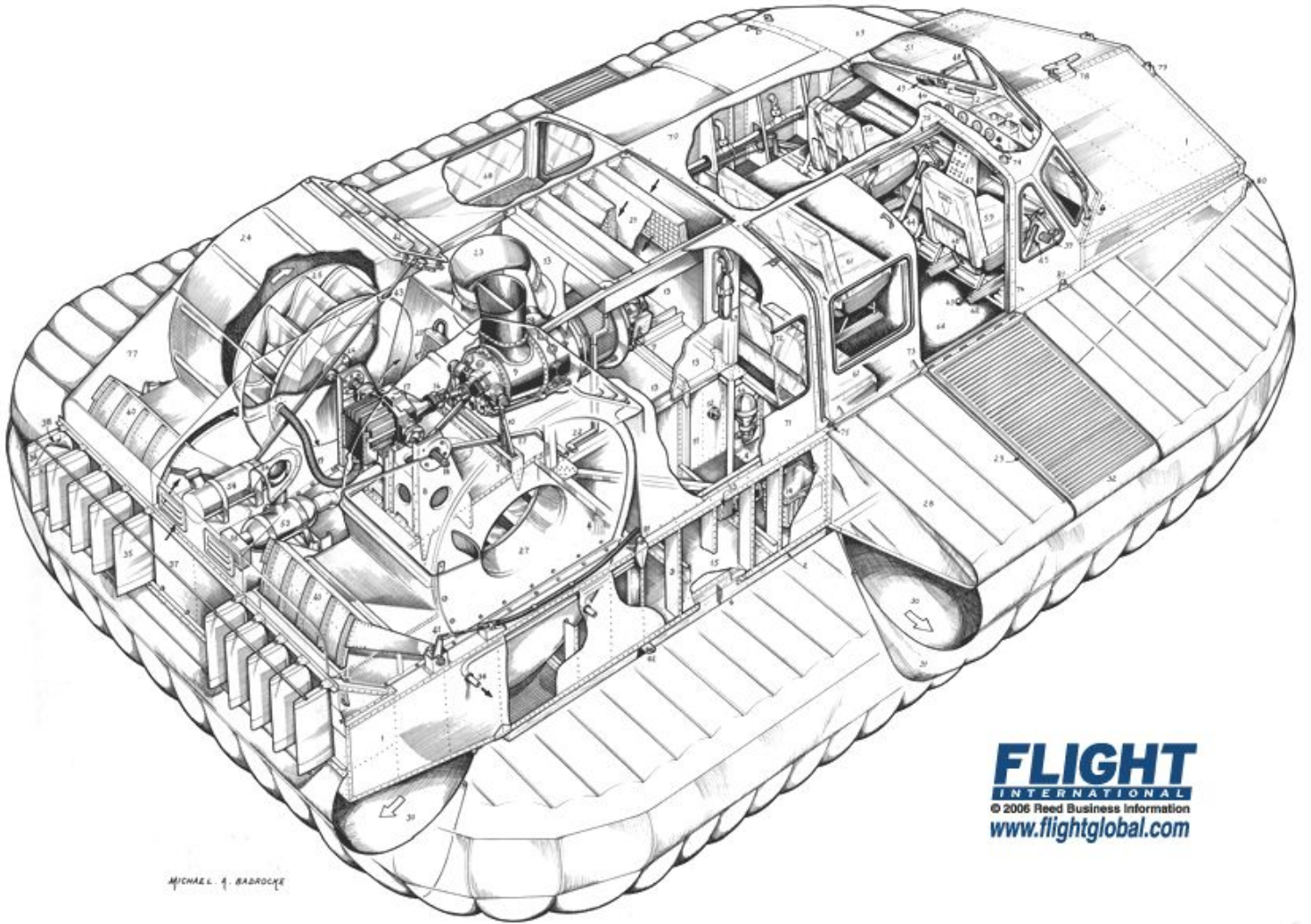

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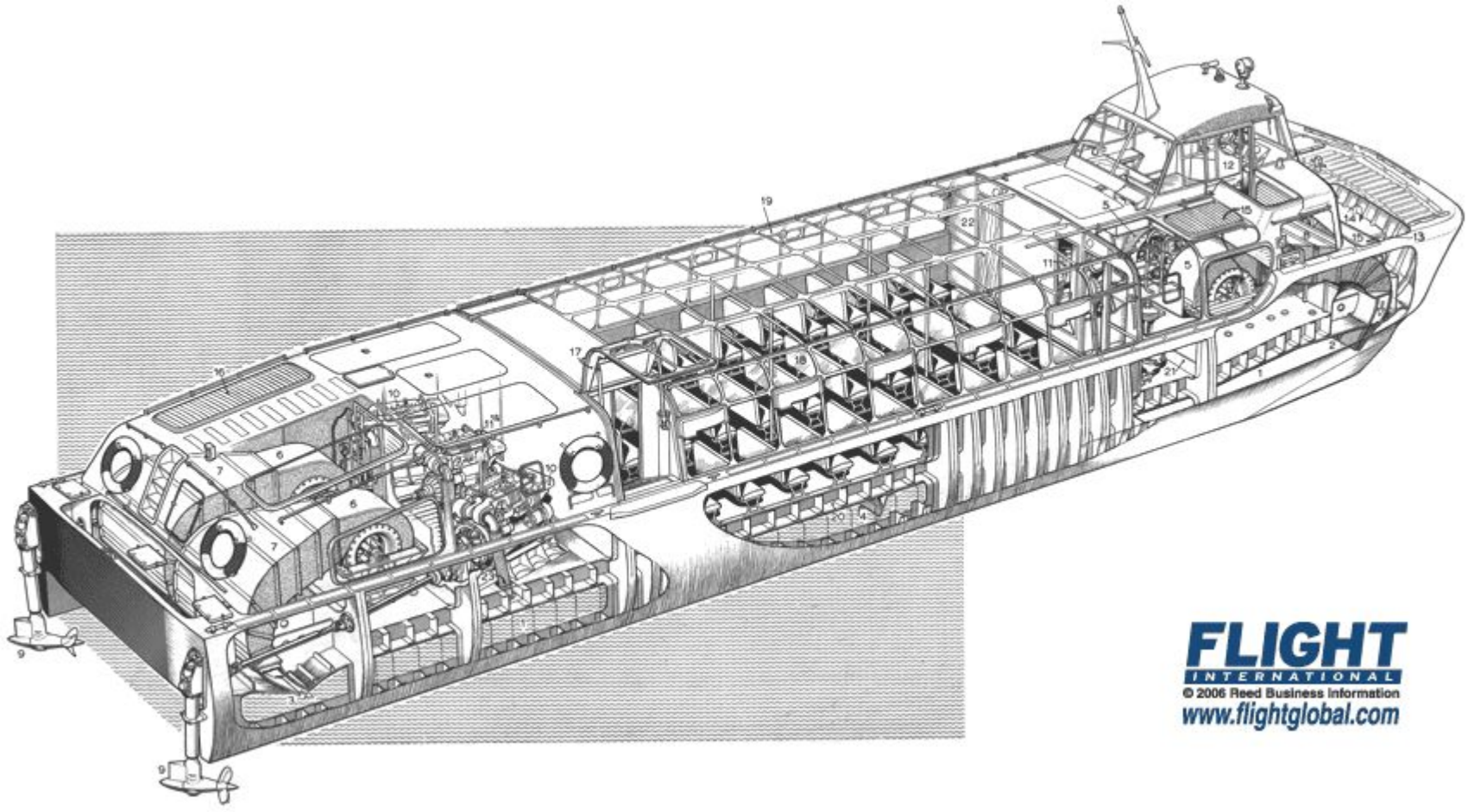


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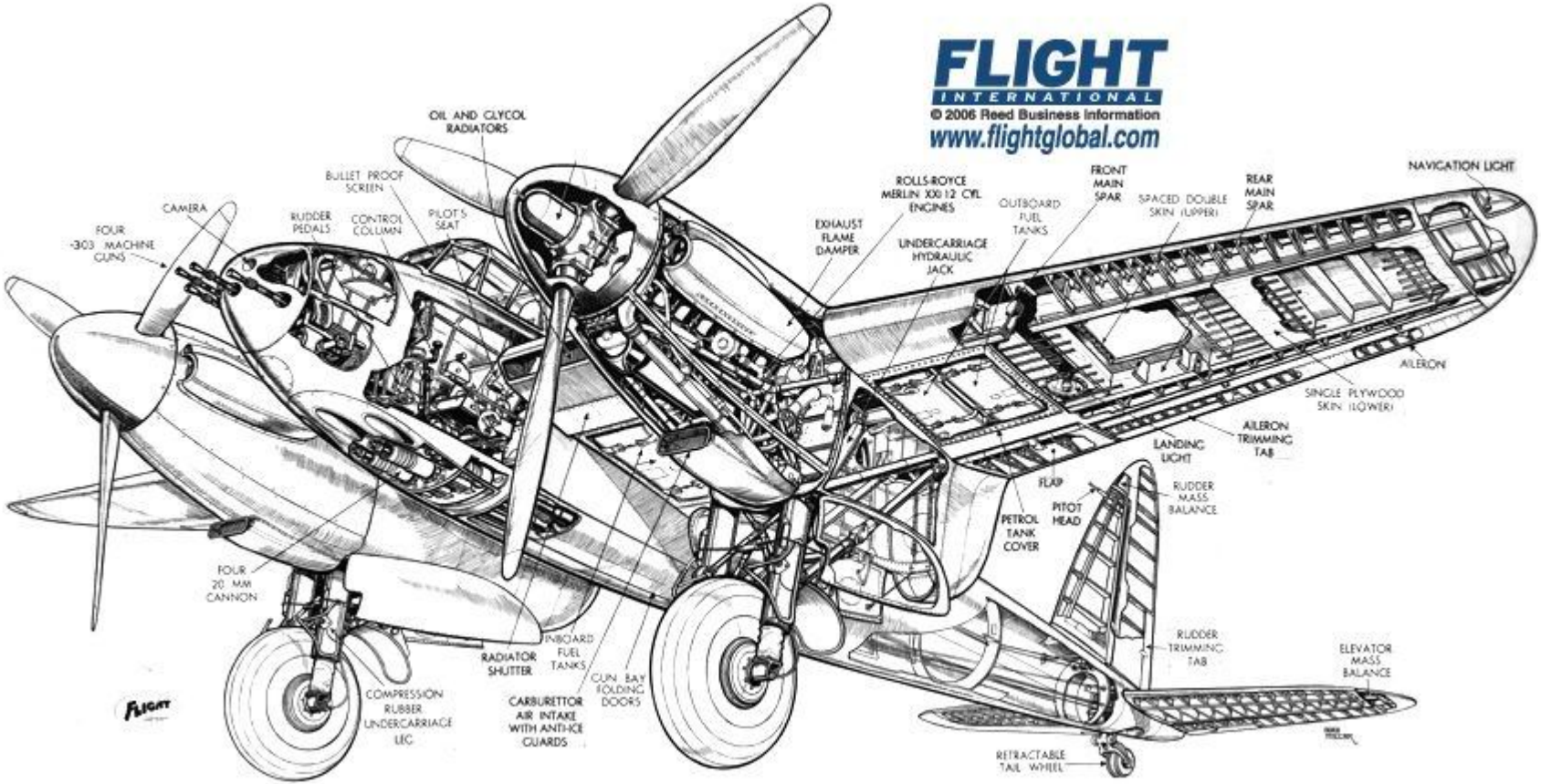


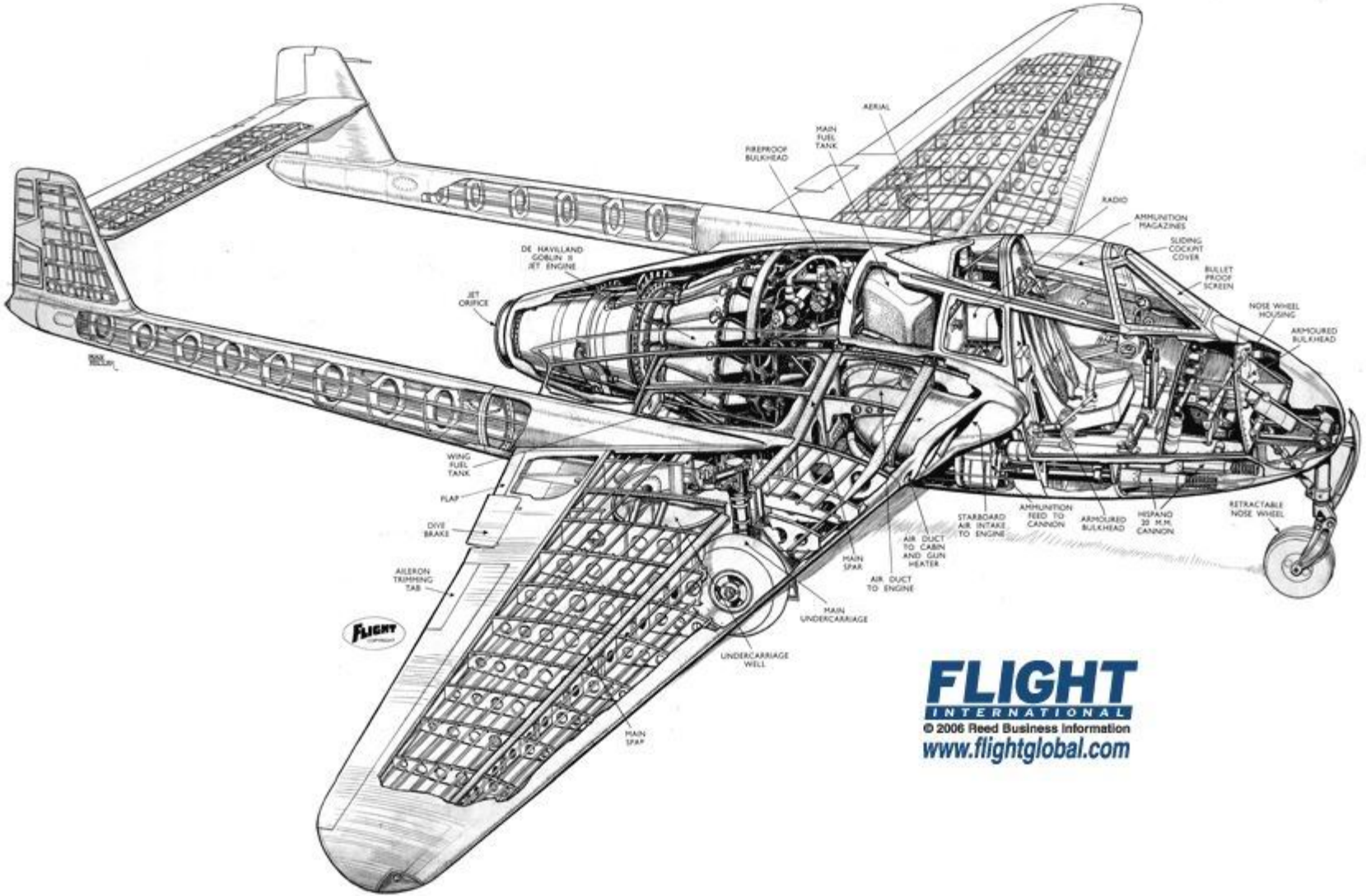
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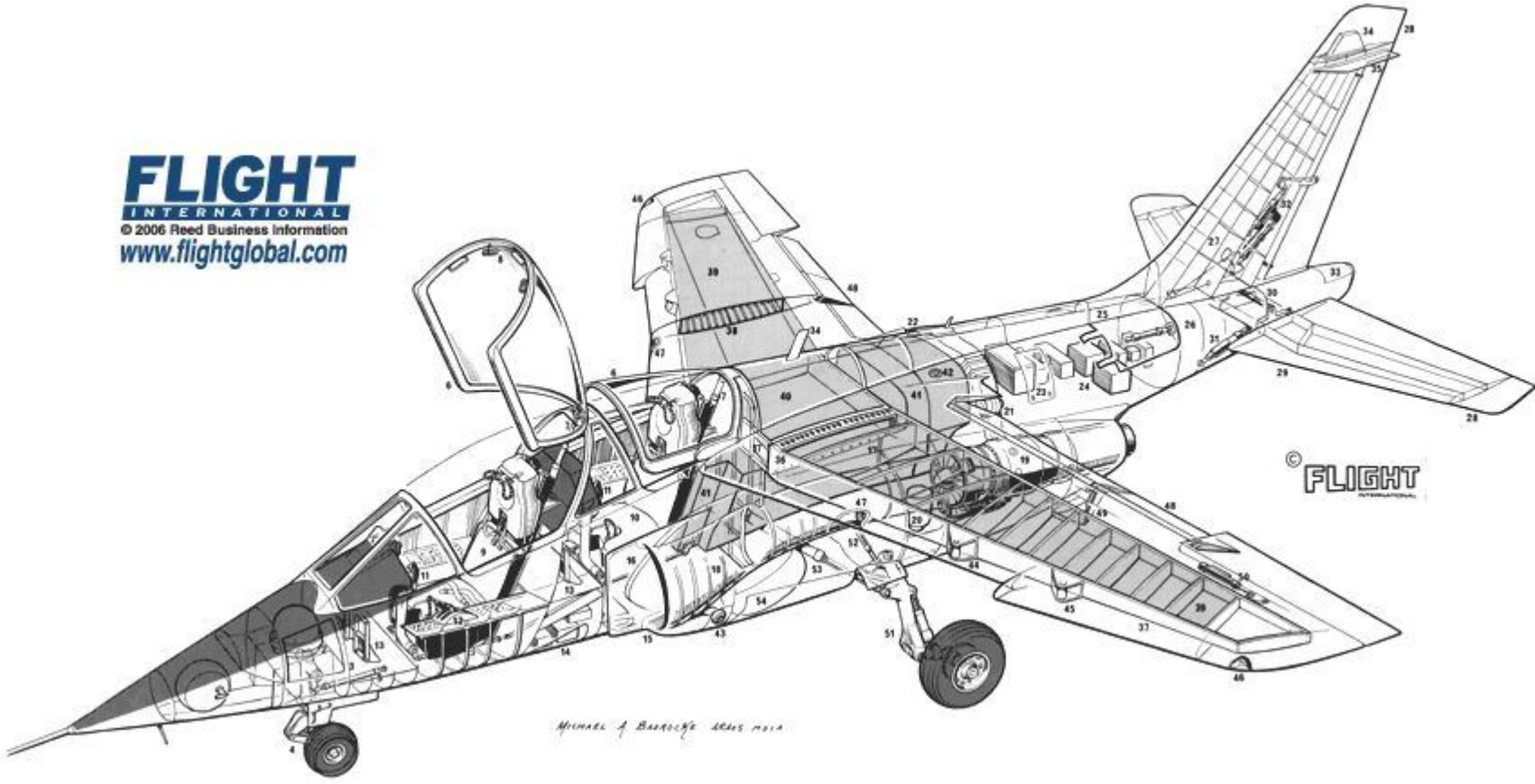

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OIL AND GLYCOL RADIATORS
BULLET PROOF SCREEN
CAMERA
FOUR .303 MACHINE GUNS
RUDDER PEDALS
CONTROL COLUMN
PILOT'S SEAT
EXHAUST FLAME DAMPER
ROLLS-ROYCE MERLIN XX 12 CYL ENGINES
UNDERCARRIAGE HYDRAULIC JACK
OUTBOARD FUEL TANKS
FRONT MAIN SPAR
SPACED DOUBLE SKIN (UPPER)
REAR MAIN SPAR
NAVIGATION LIGHT
AILERON
SINGLE PLYWOOD SKIN (LOWER)
AILERON TRIMMING TAB
LANDING LIGHT
FLAP
PETROL TANK COVER
PITOT HEAD
RUDDER MASS BALANCE
FOUR 20 MM CANNON
RADIATOR SHUTTER
INBOARD FUEL TANKS
GUN BAY FOLDING DOORS
CARBURETTOR AIR INTAKE WITH ANTI-ICE GUARDS
COMPRESSION RUBBER UNDERCARRIAGE LEG
RUDDER TRIMMING TAB
ELEVATOR MASS BALANCE
RETRACTABLE TAIL WHEEL
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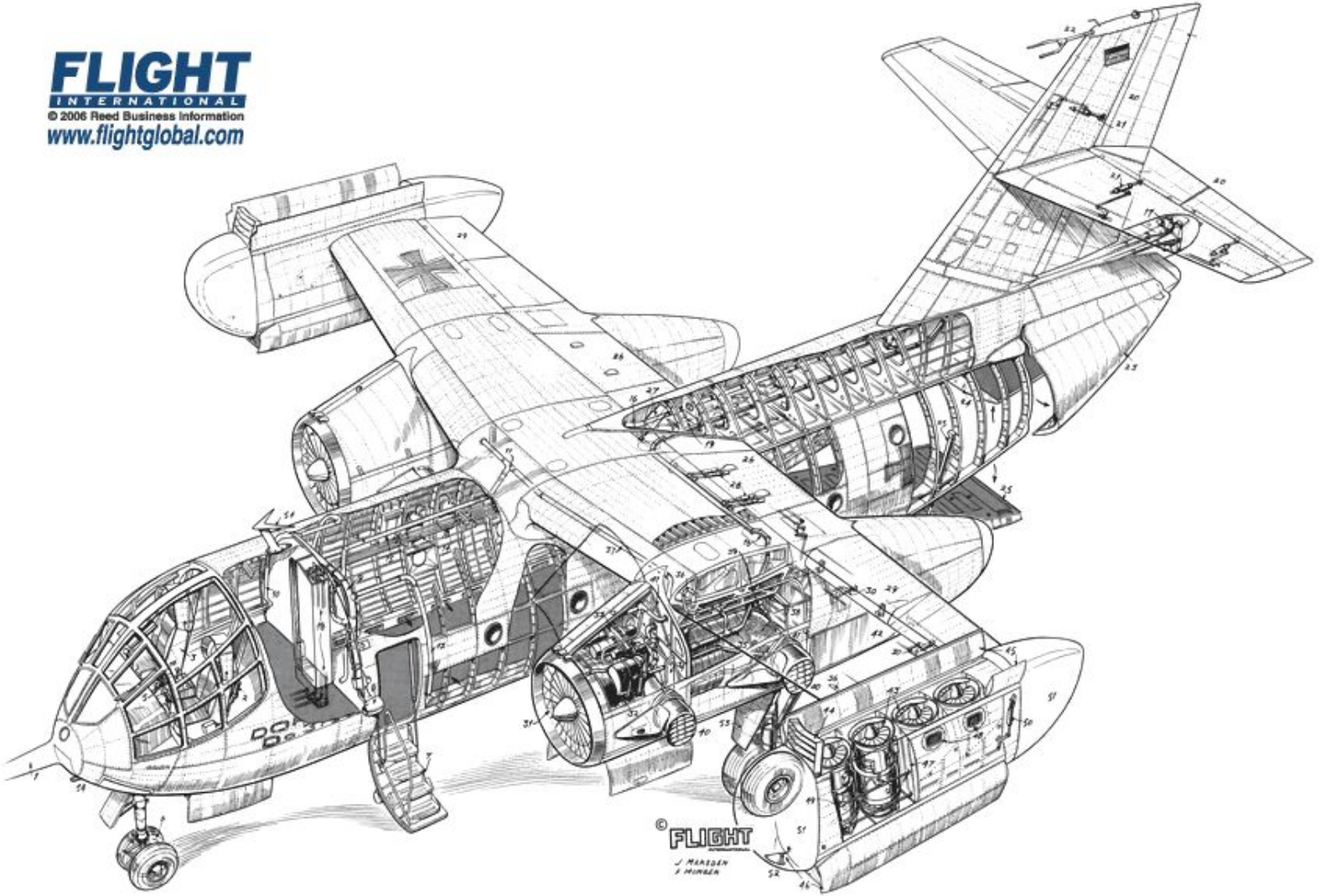
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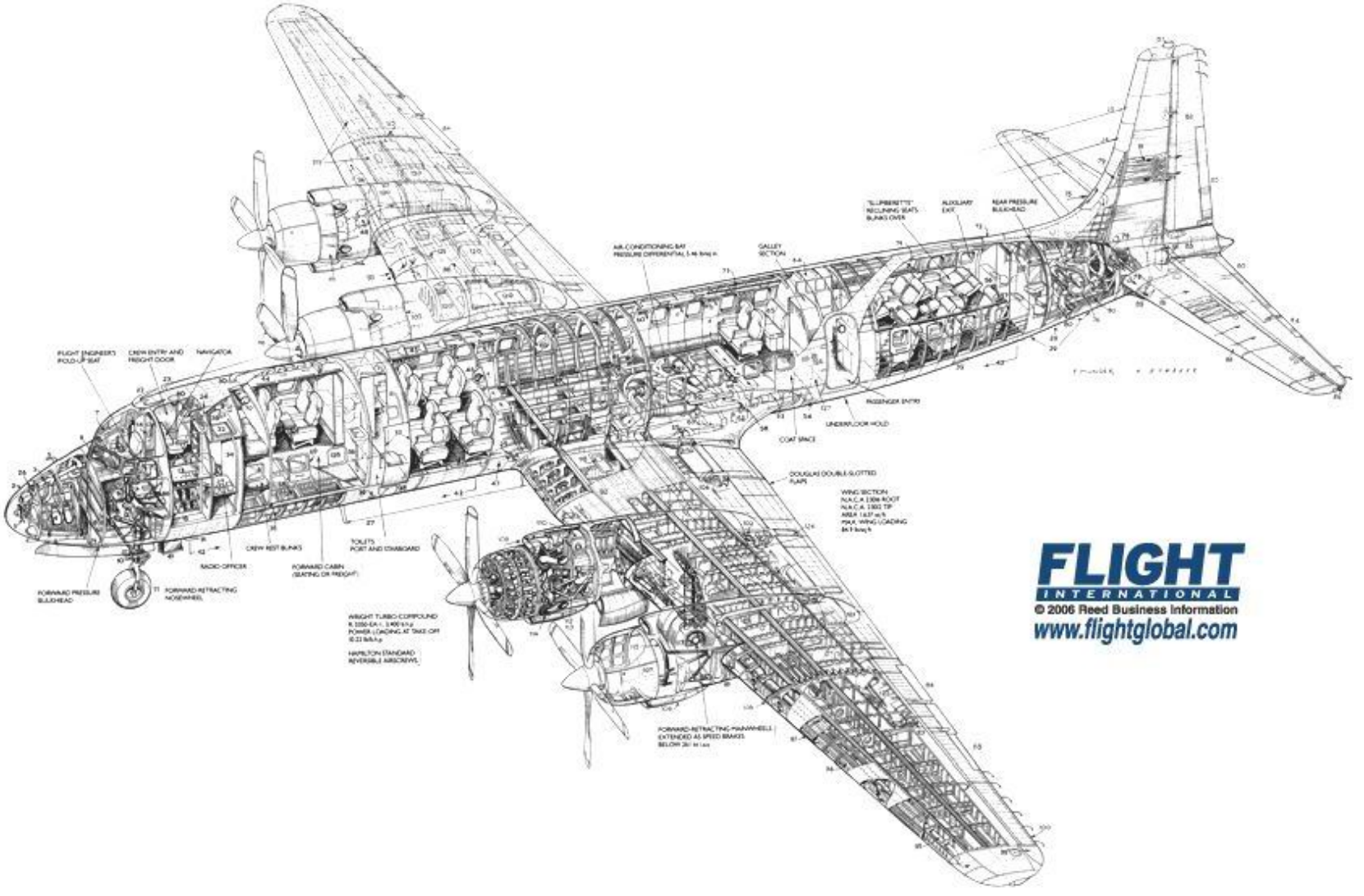

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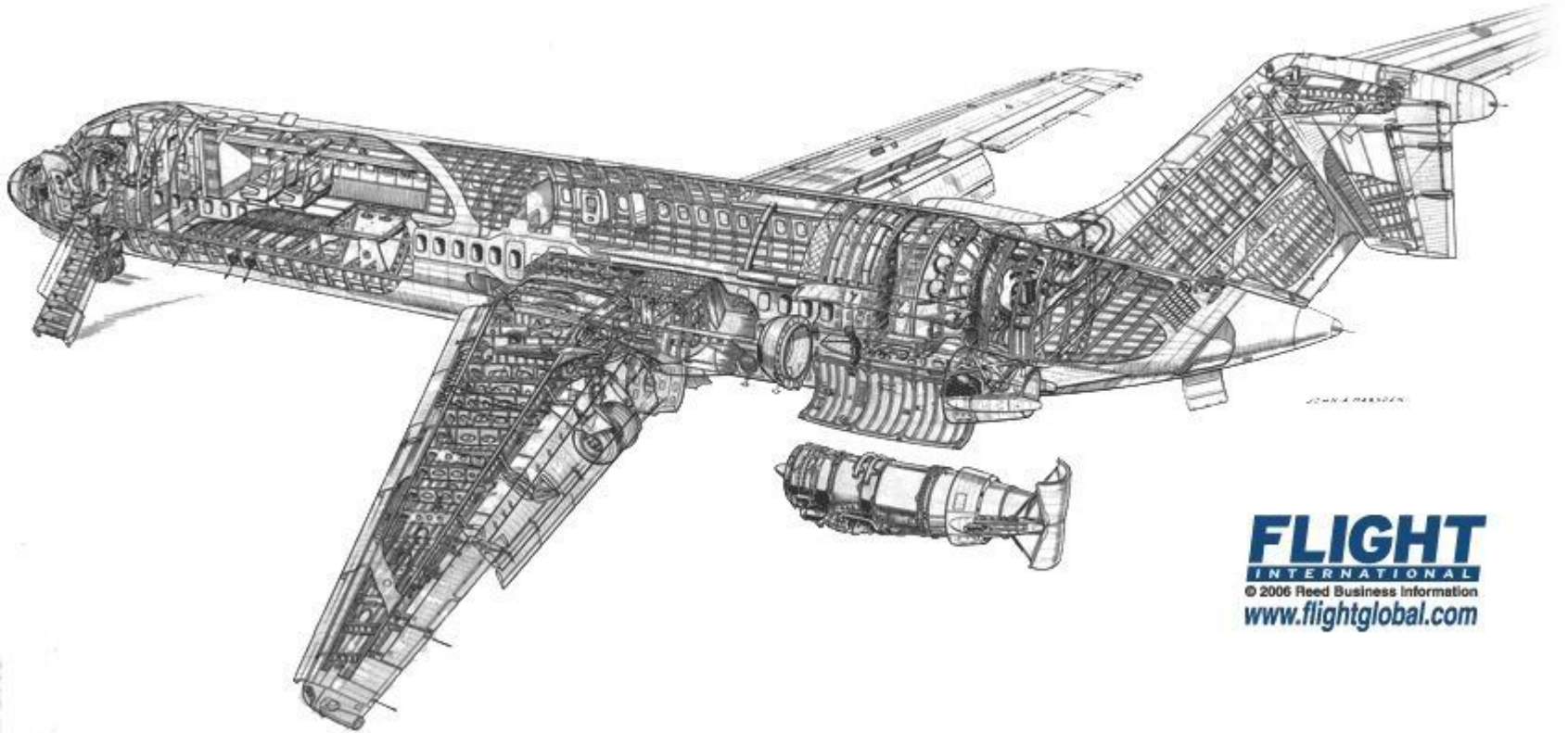


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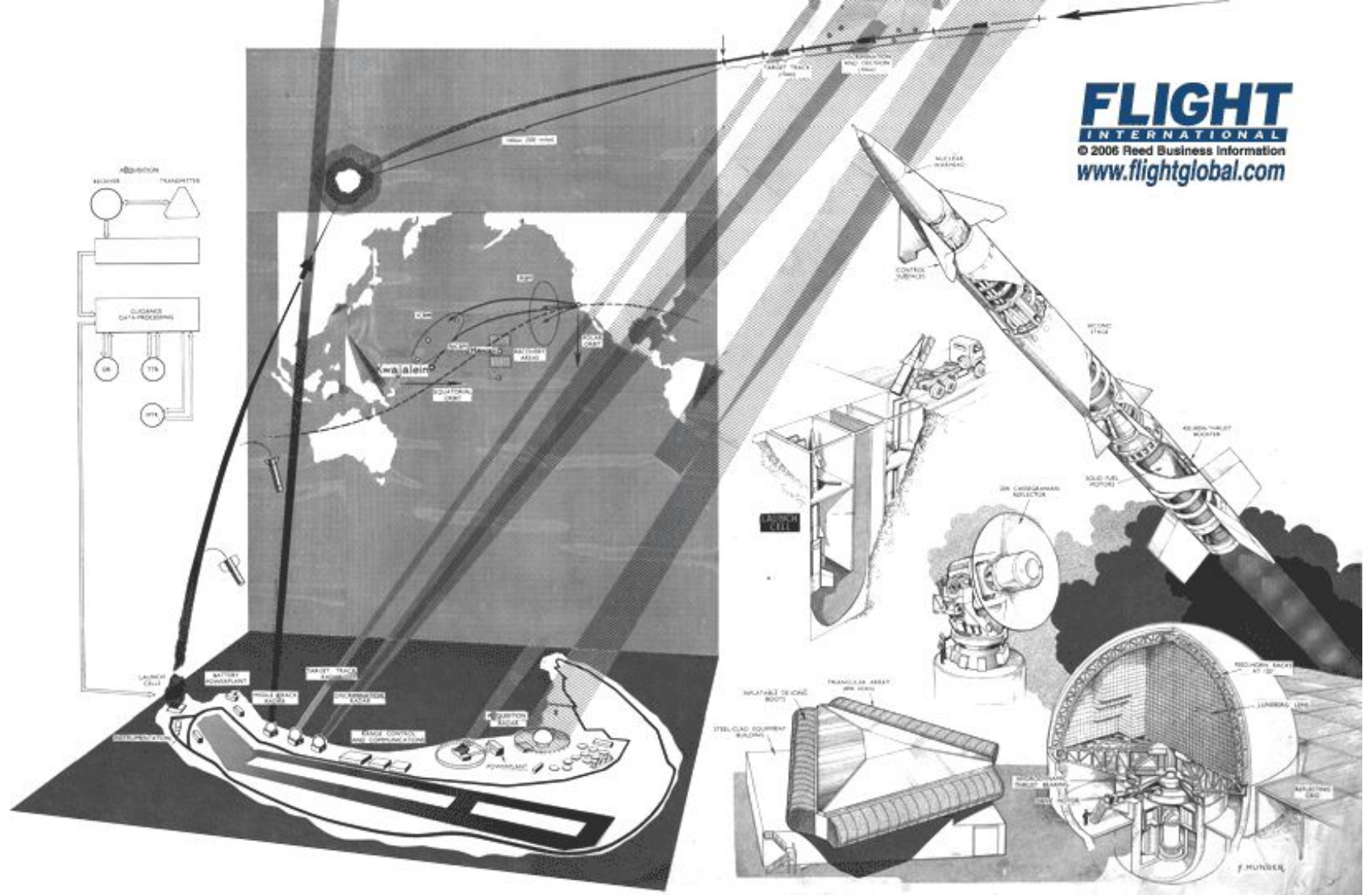
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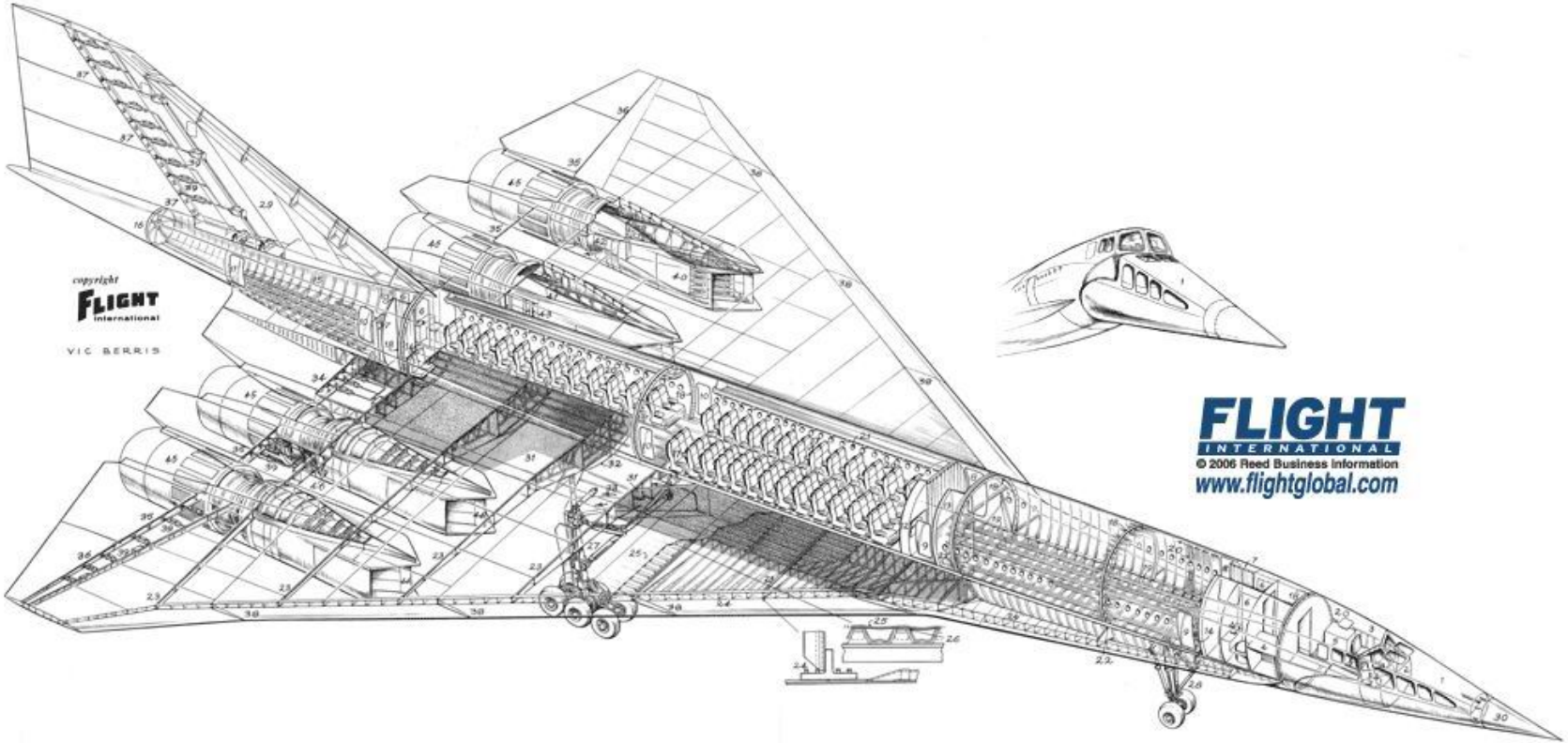
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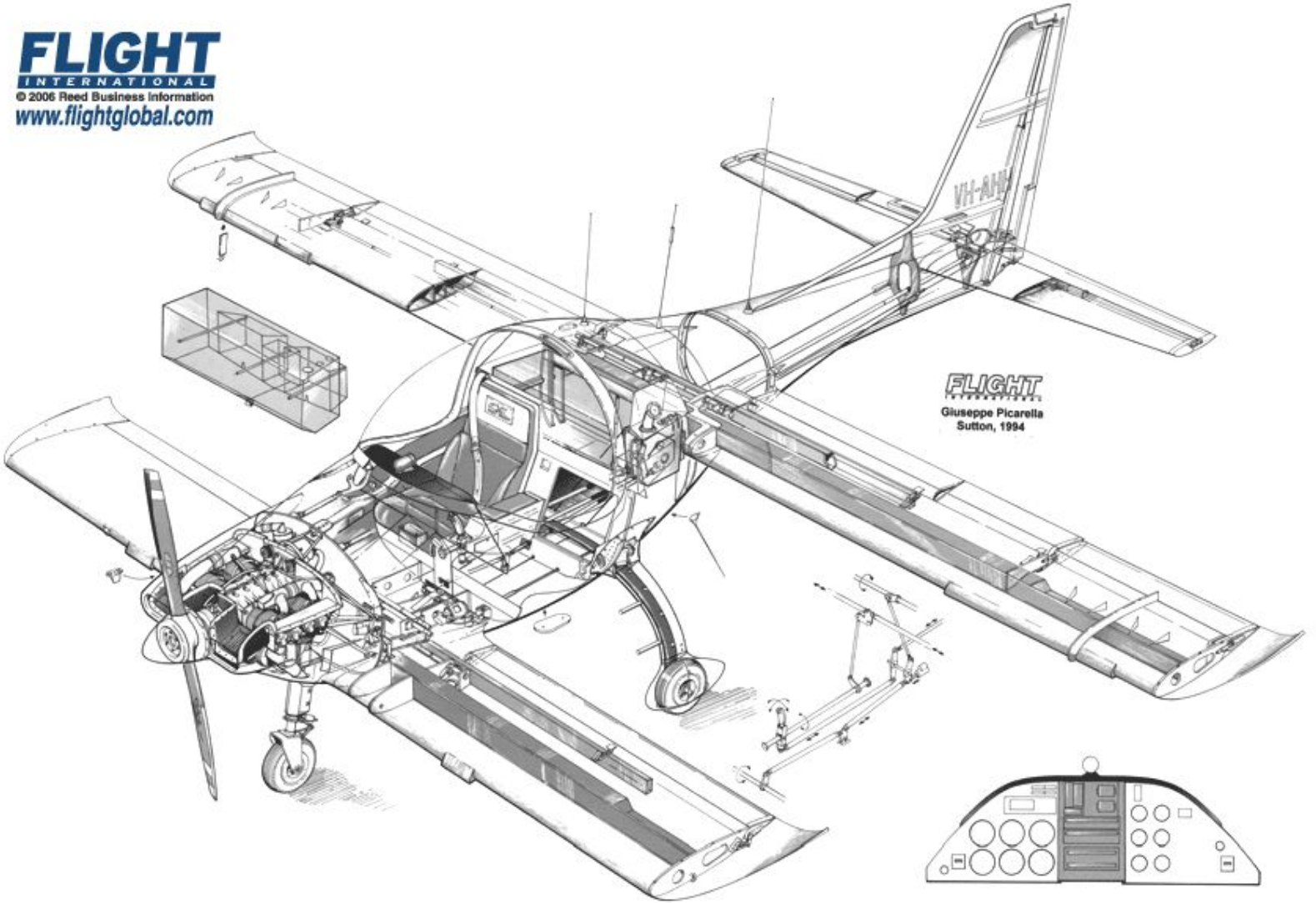
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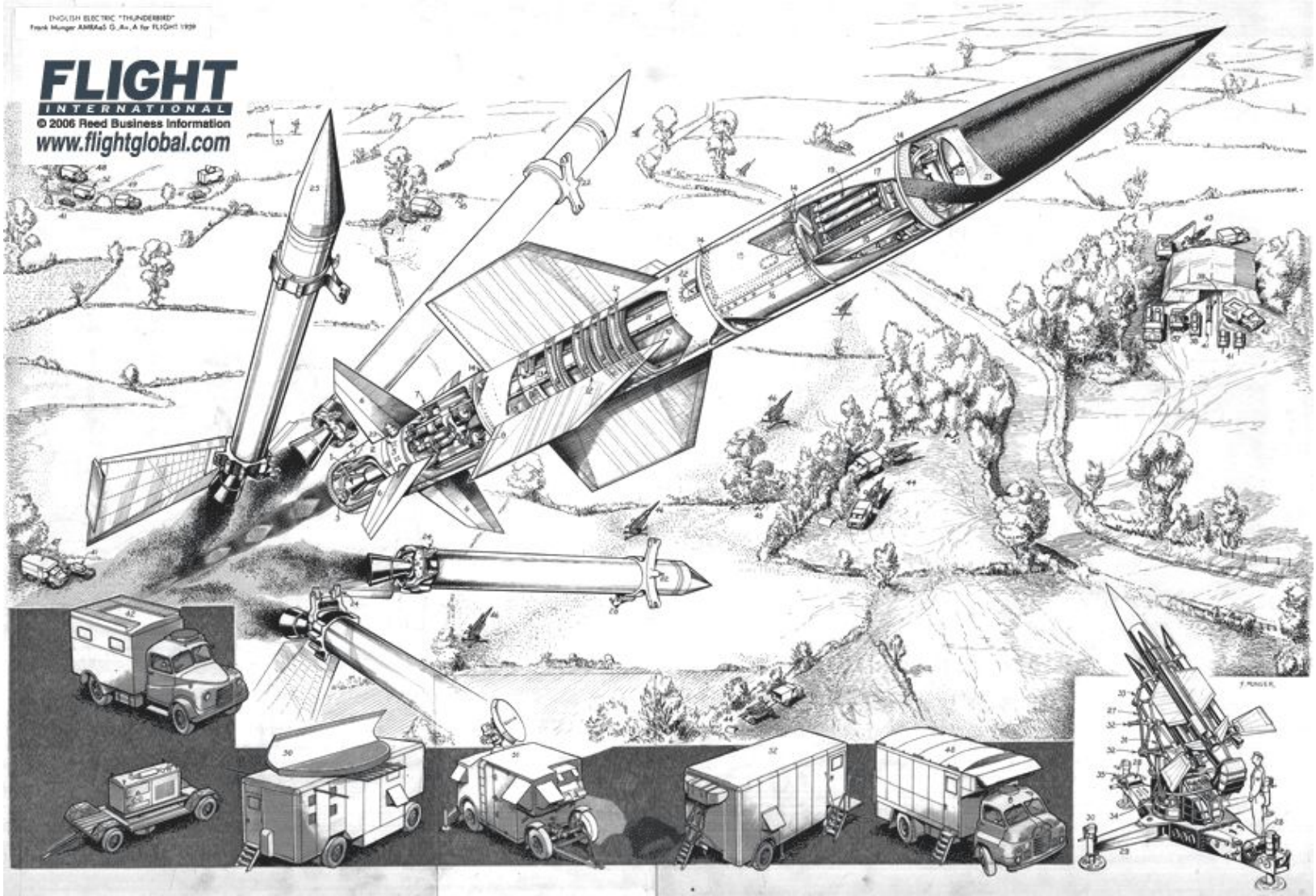

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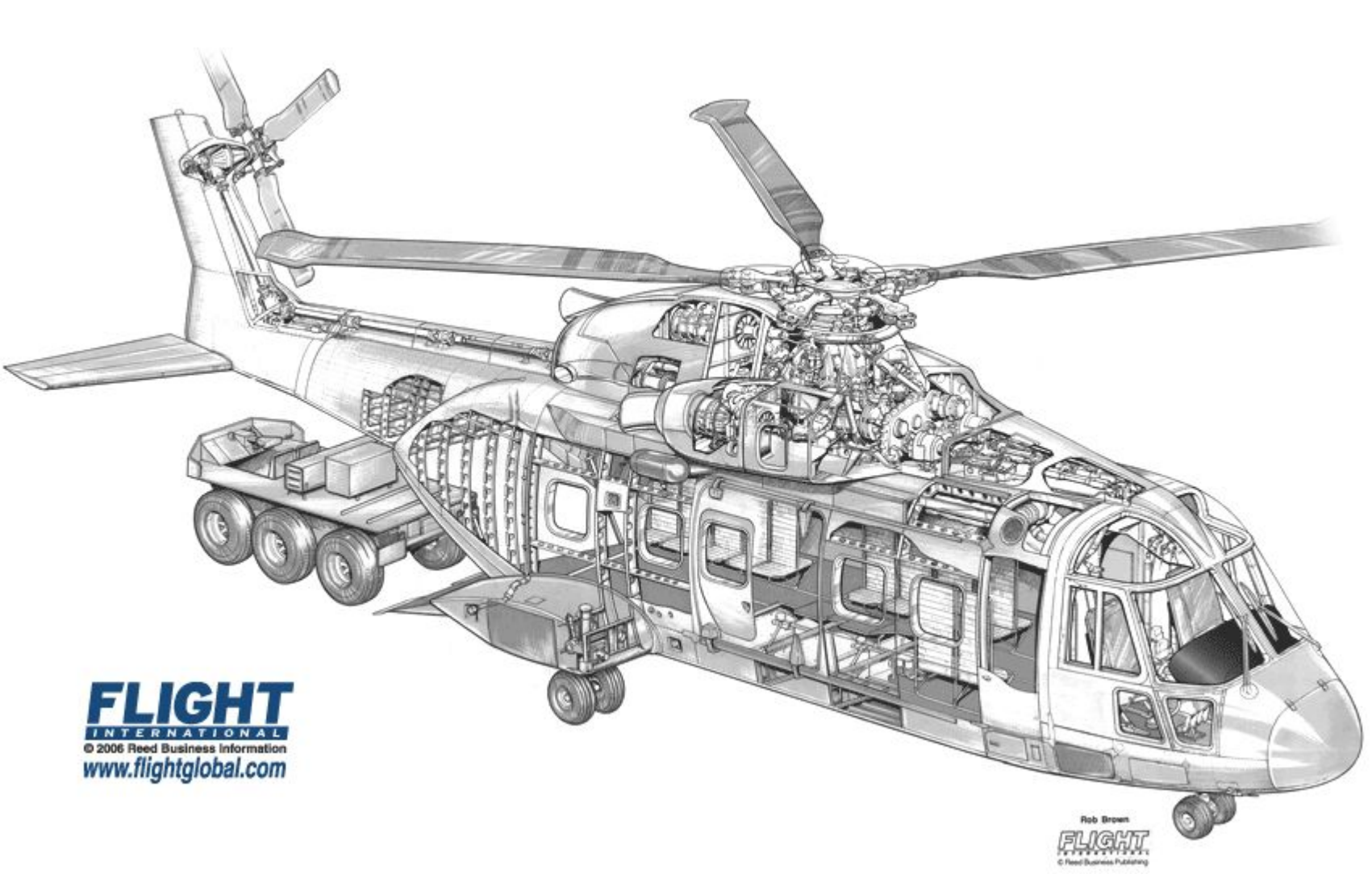
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ENGLISH ELECTRIC "THUNDERBIRD"
Frank Munger AMRAeS G.,Av.,A for FLIGHT 1959

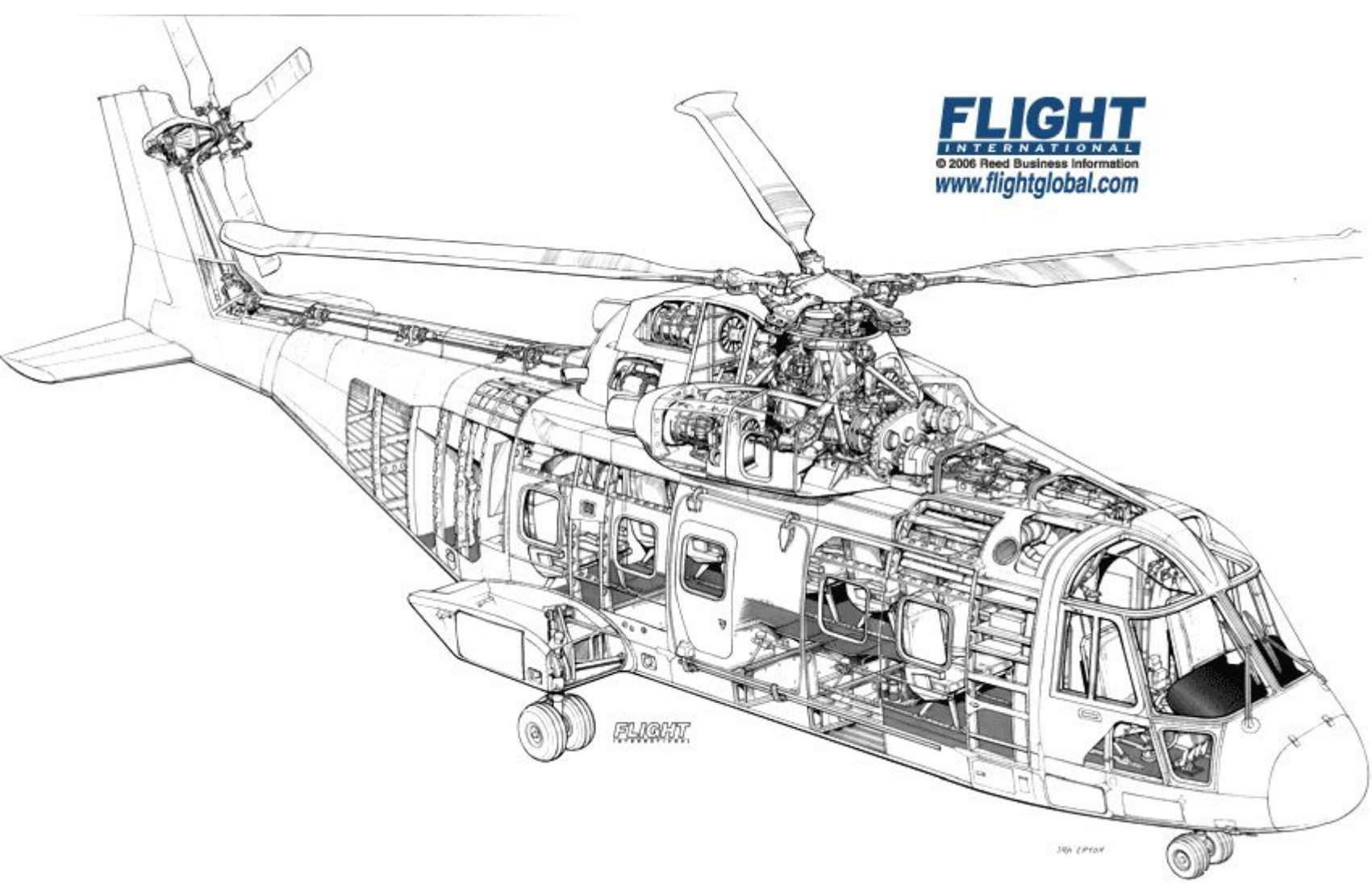
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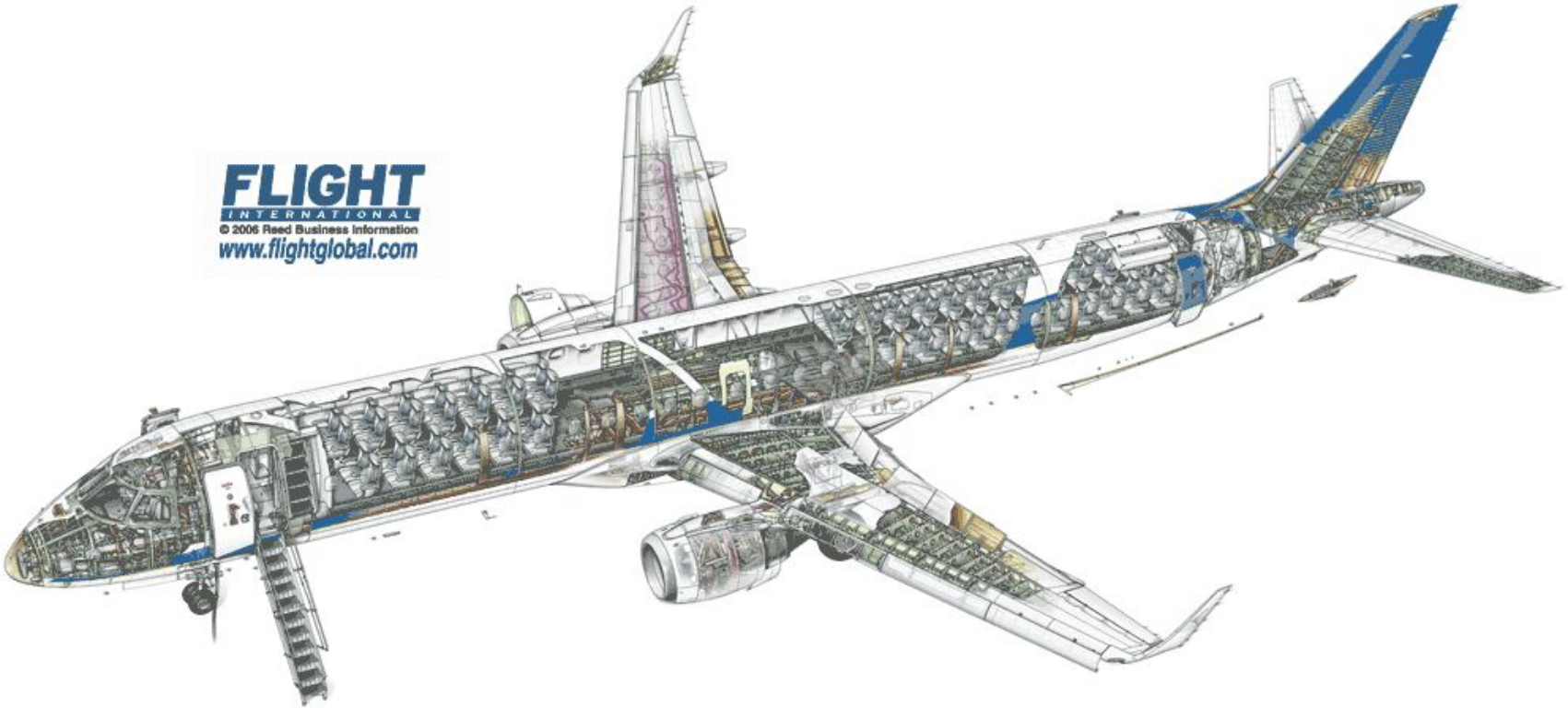


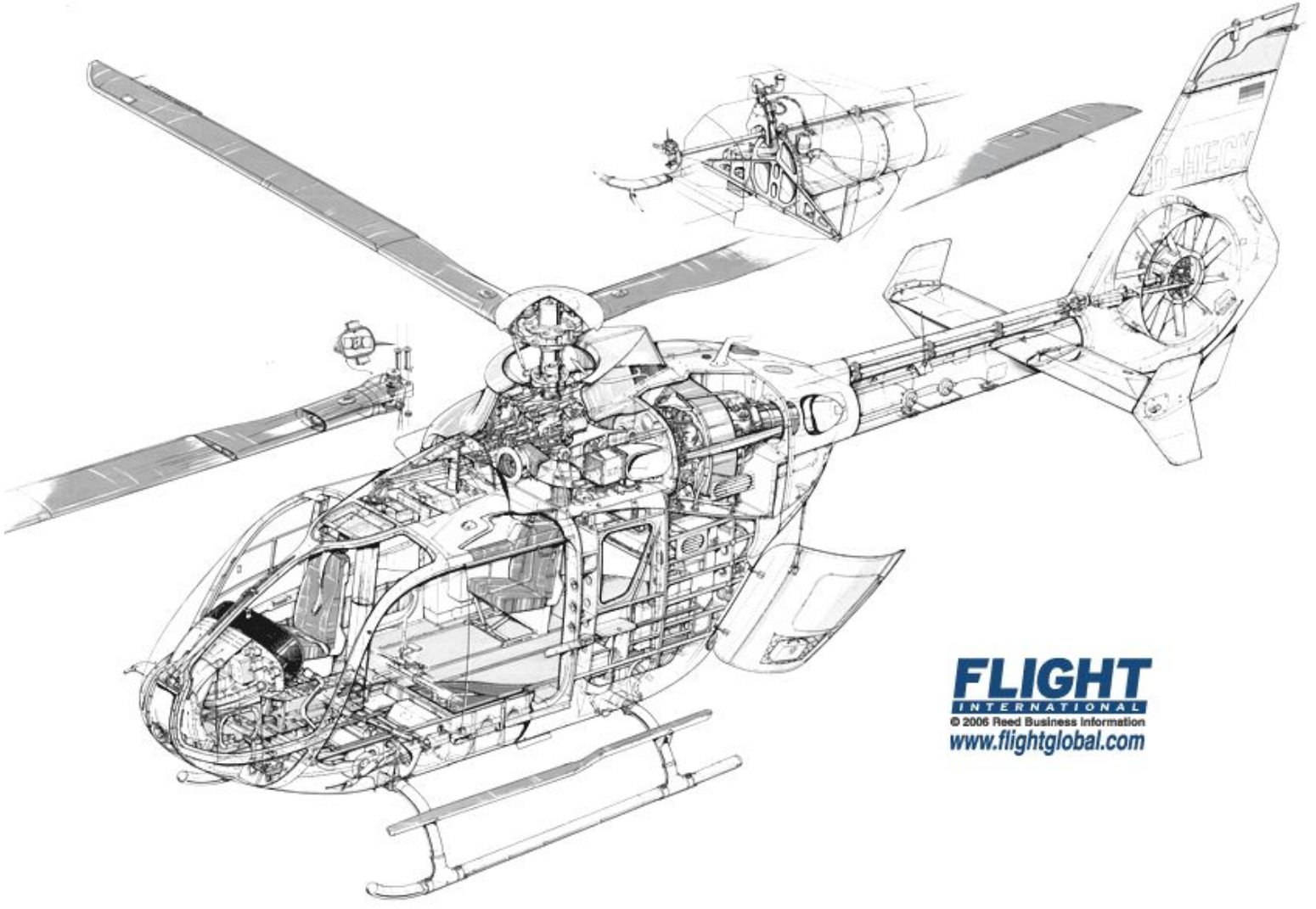


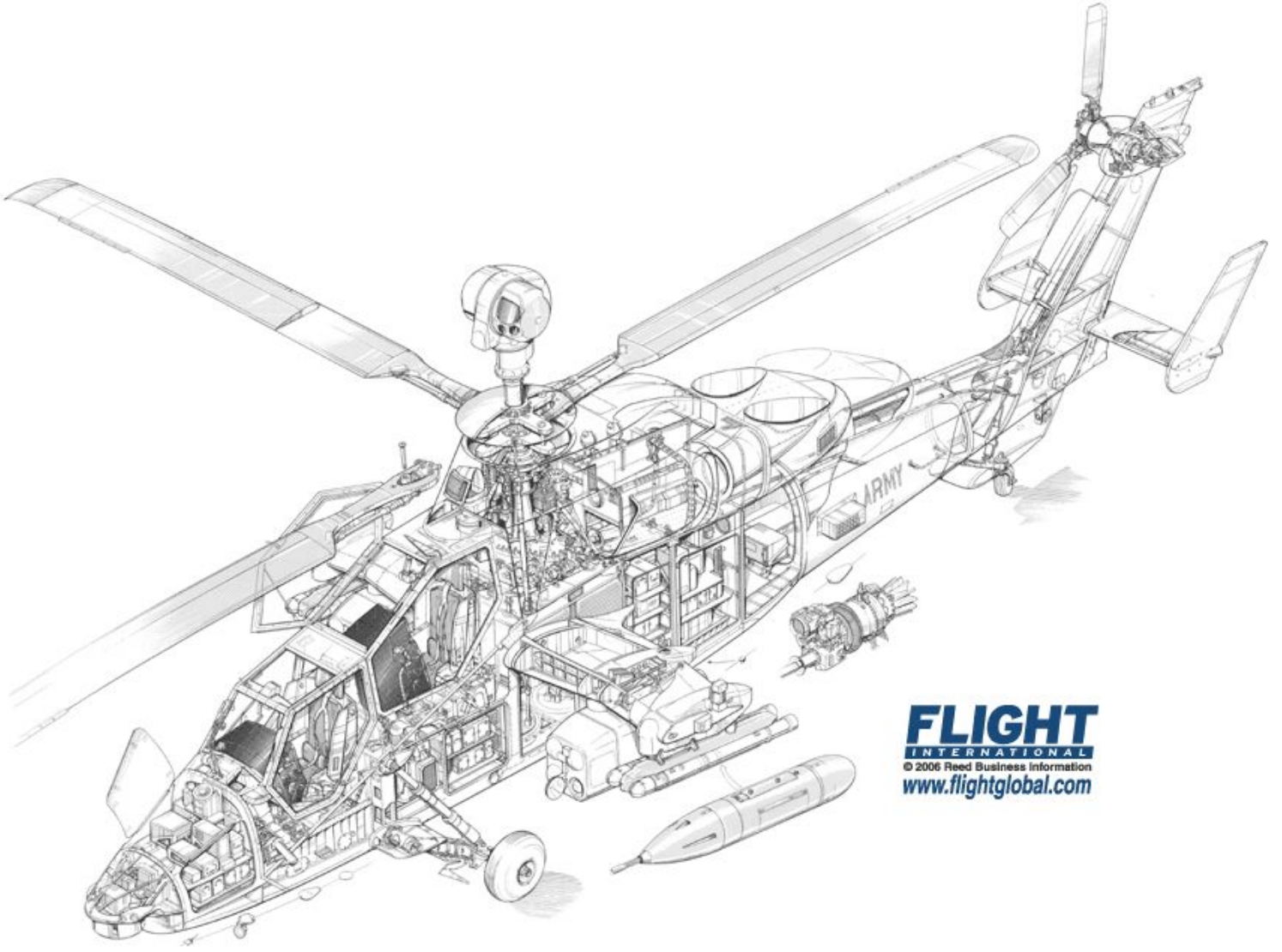
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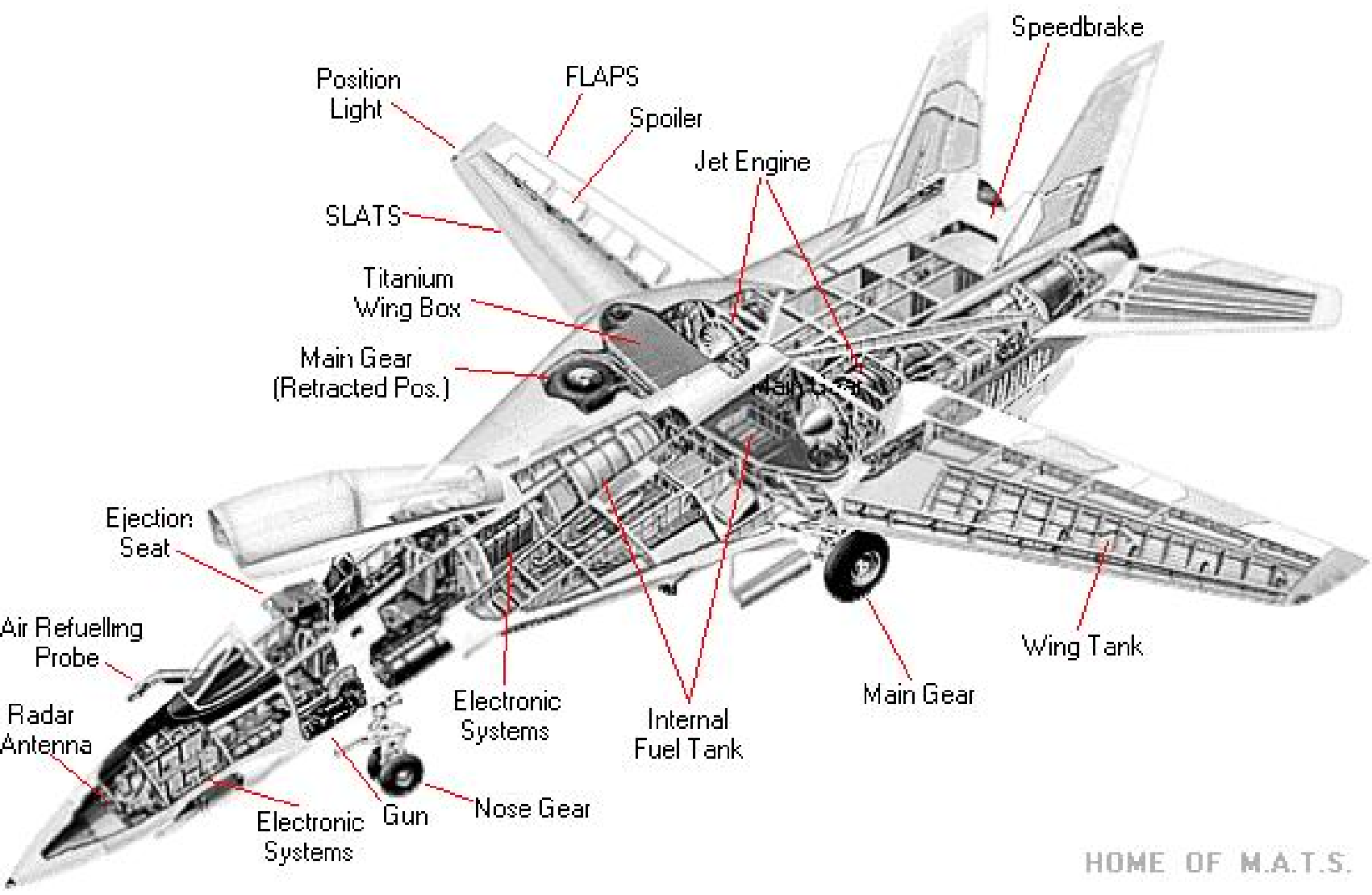

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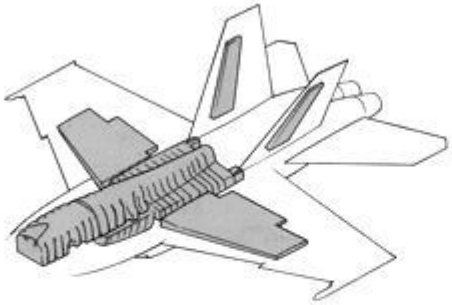
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Speedbrake
Position Light
FLAPS
Spoiler
Jet Engine
SLATS
Titanium Wing Box
Main Gear (Retracted Pos.)
Ejection Seat
Air Refuelling Probe
Radar Antenna
Electronic Systems
Gun
Nose Gear
Electronic Systems
Internal Fuel Tank
Main Gear
Wing Tank
HOME OF M.A.T.S.

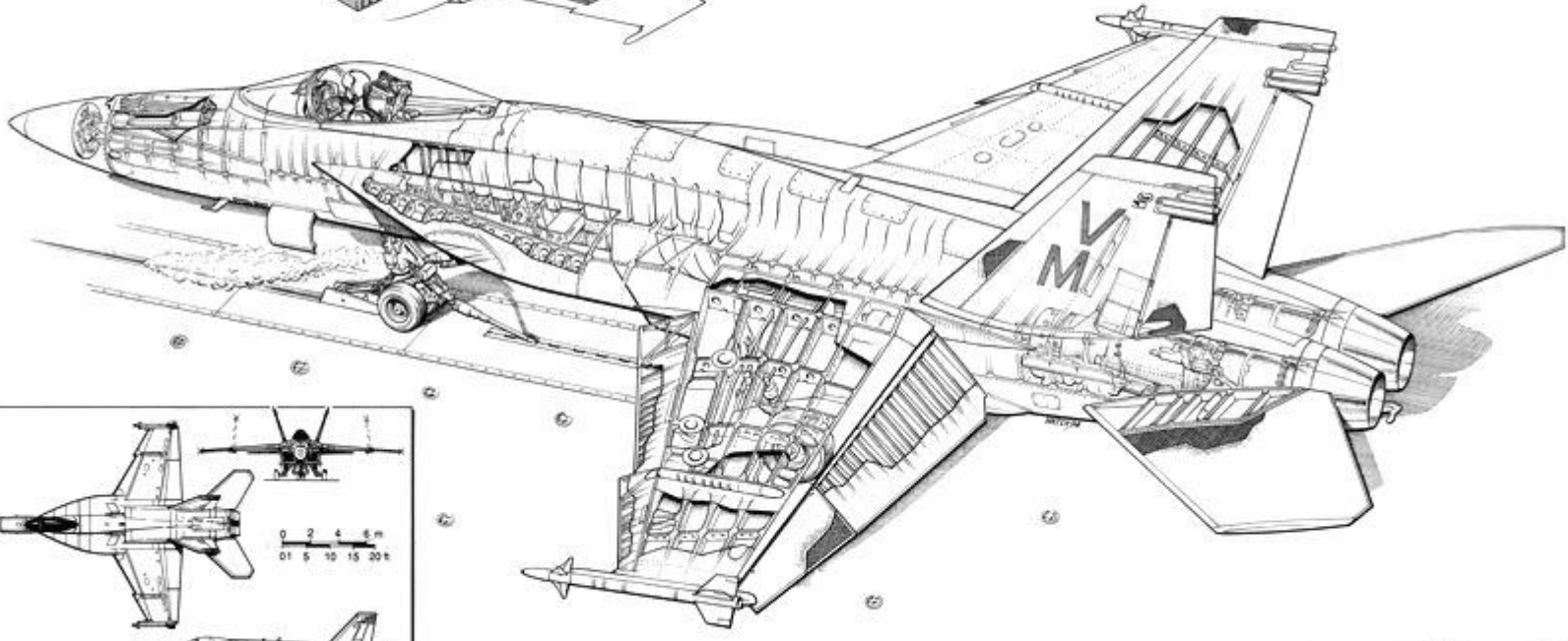
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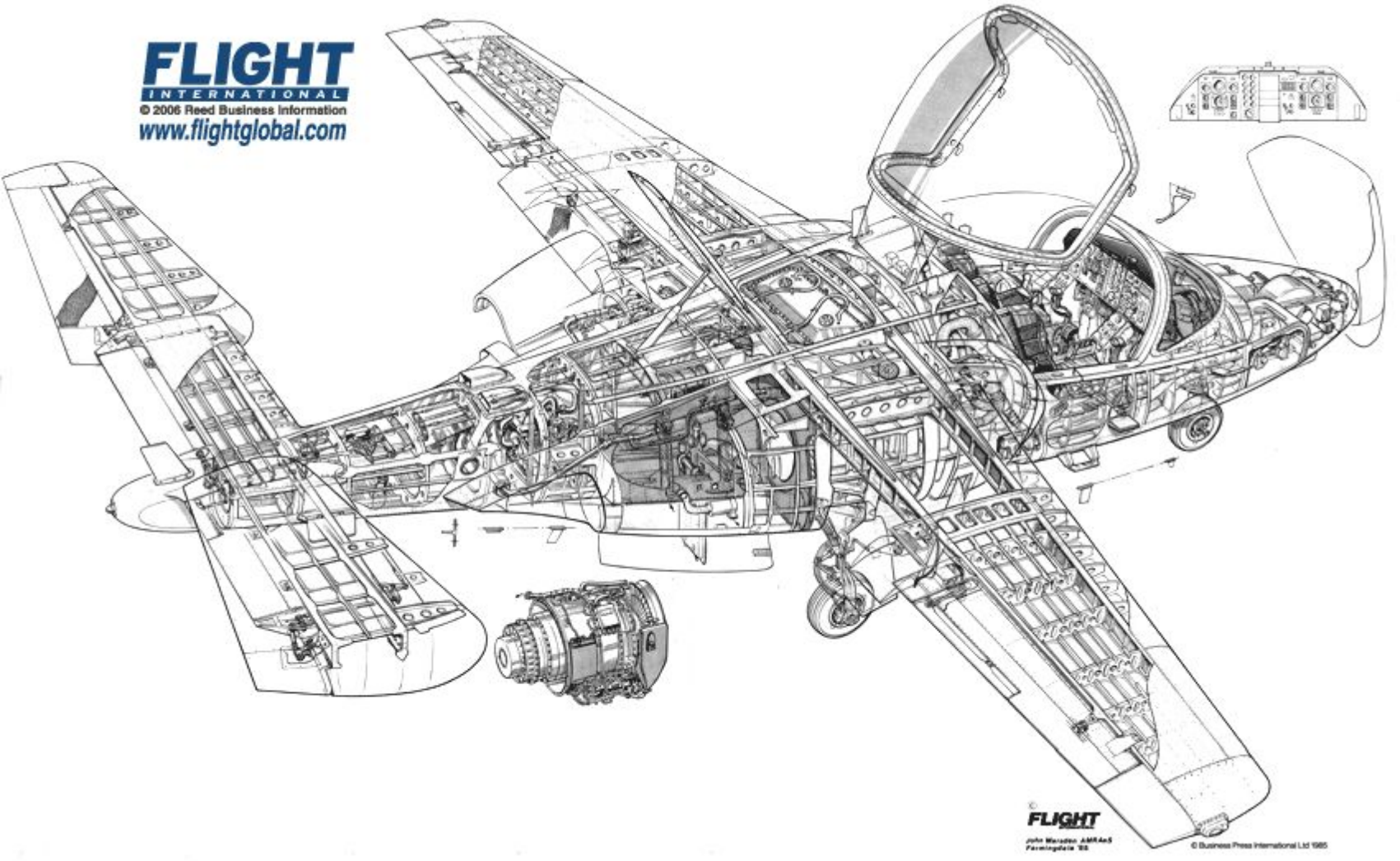




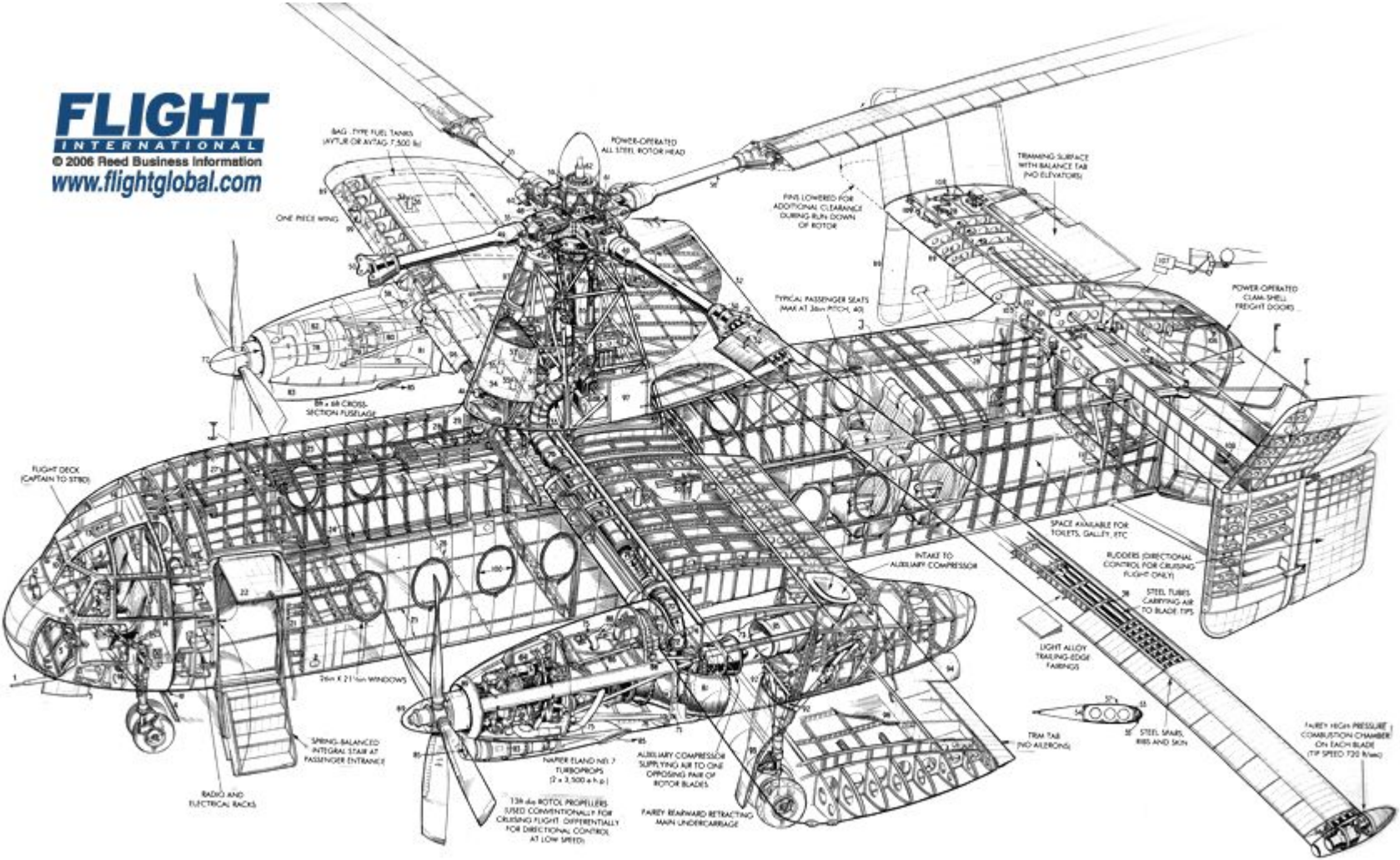


McDonnell-Douglas F/A-18E

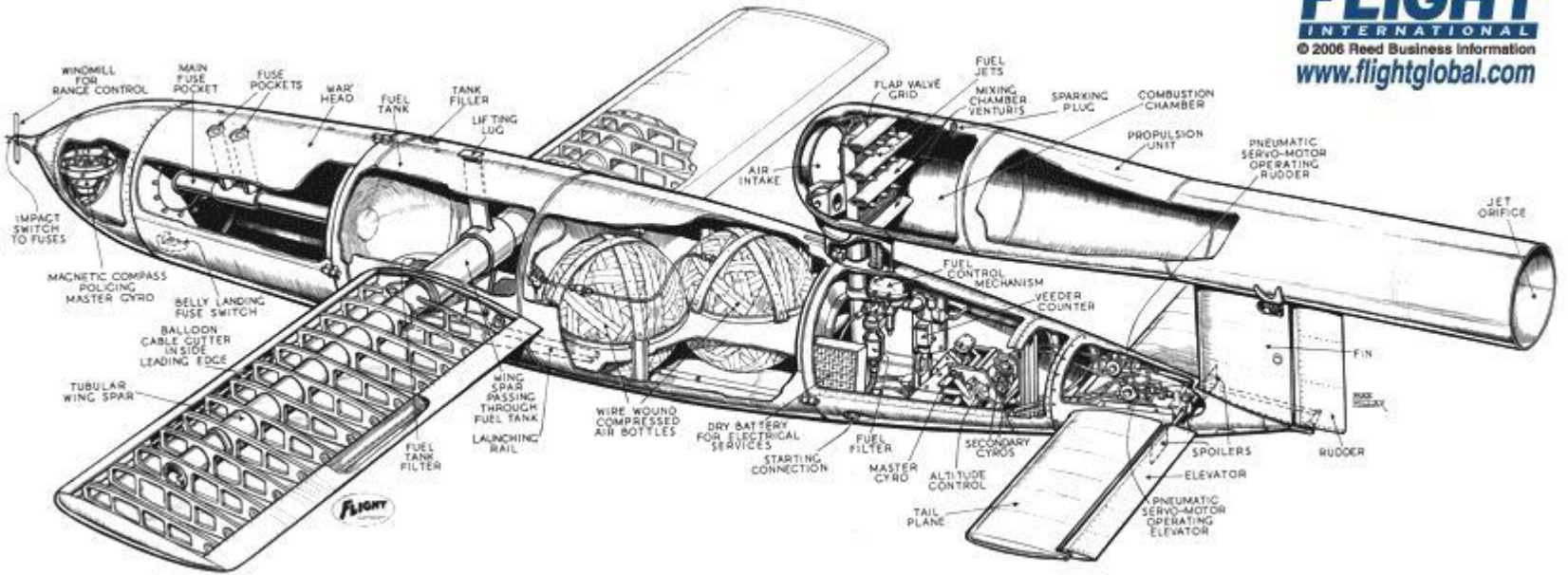
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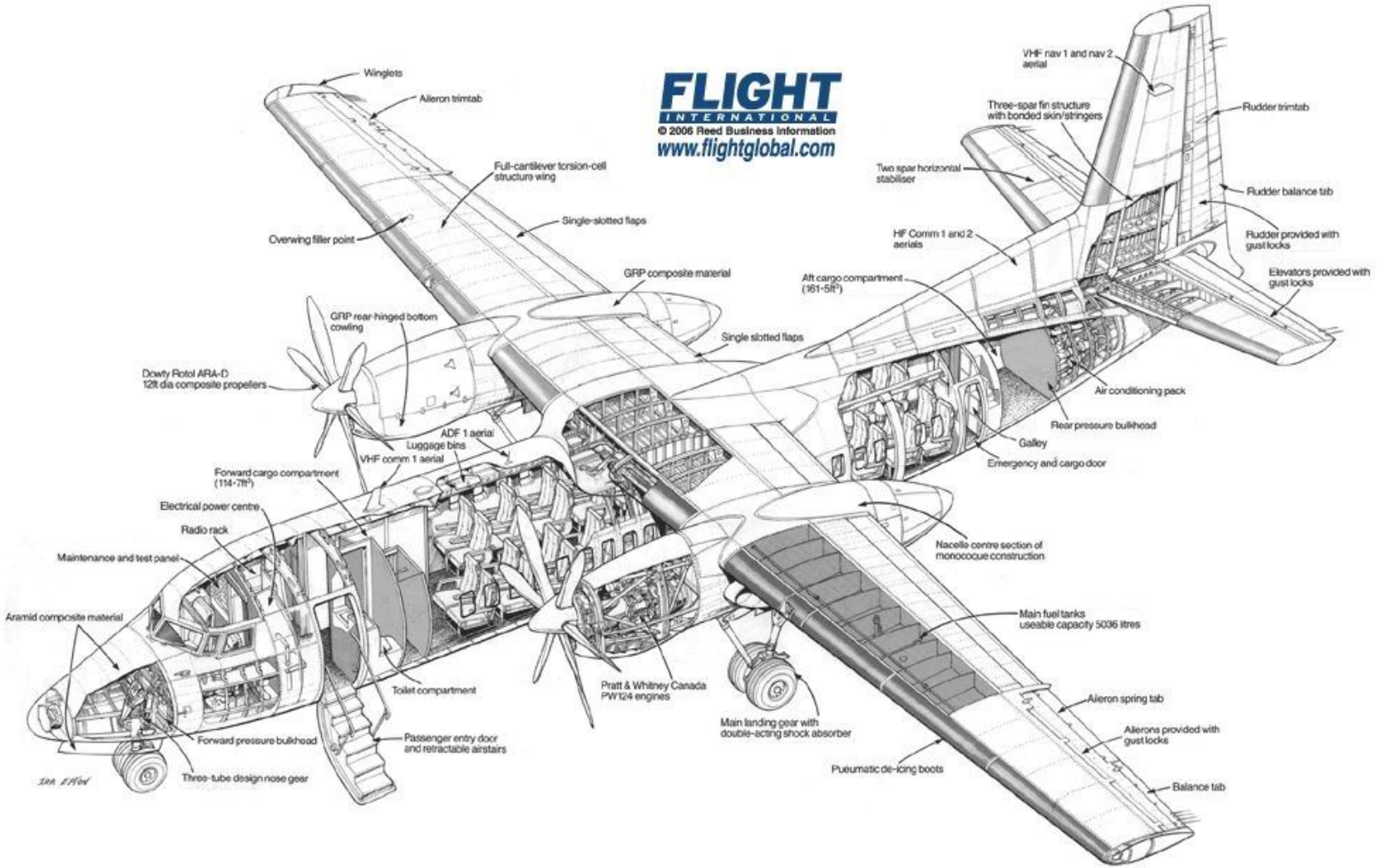


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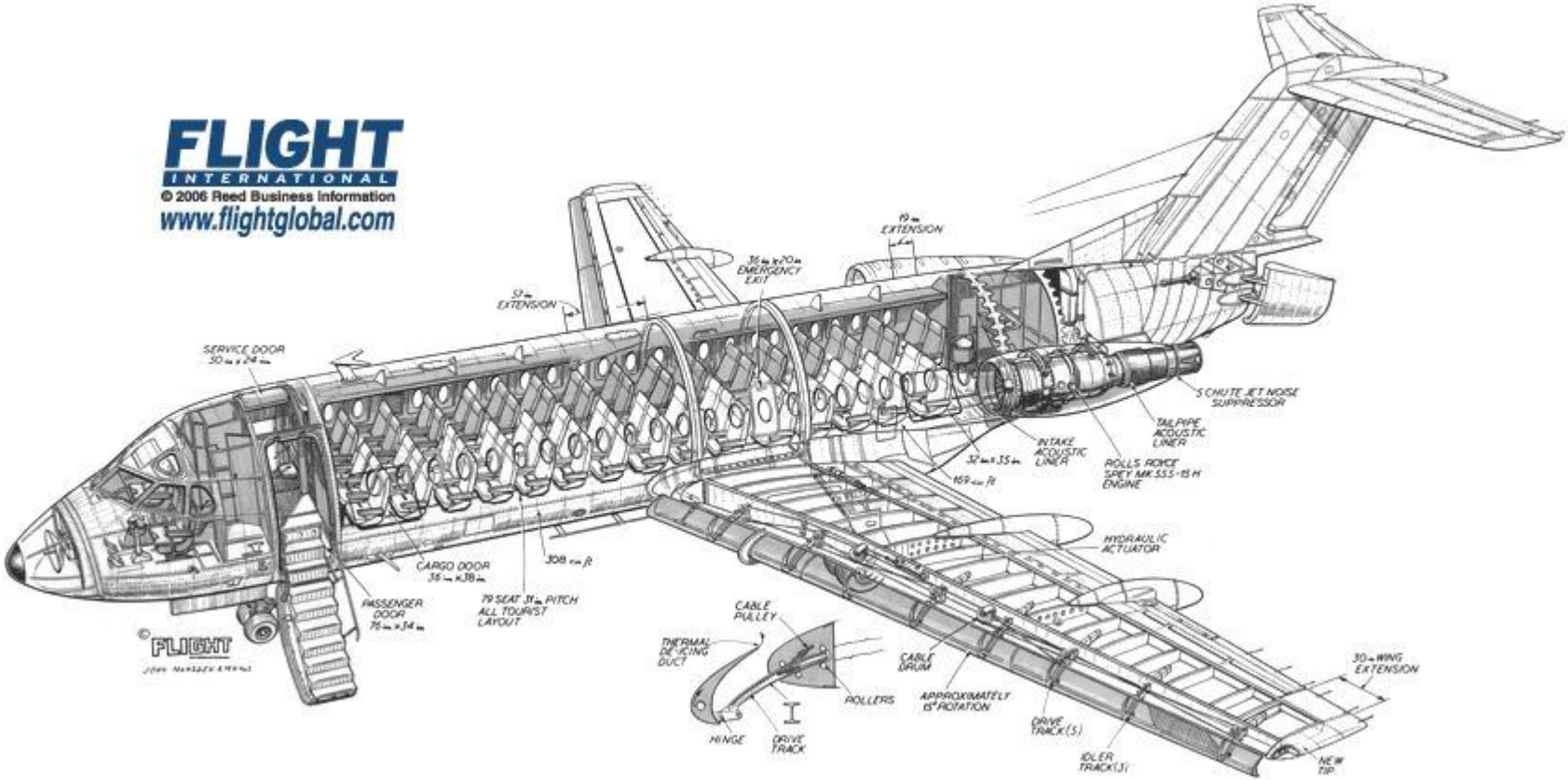


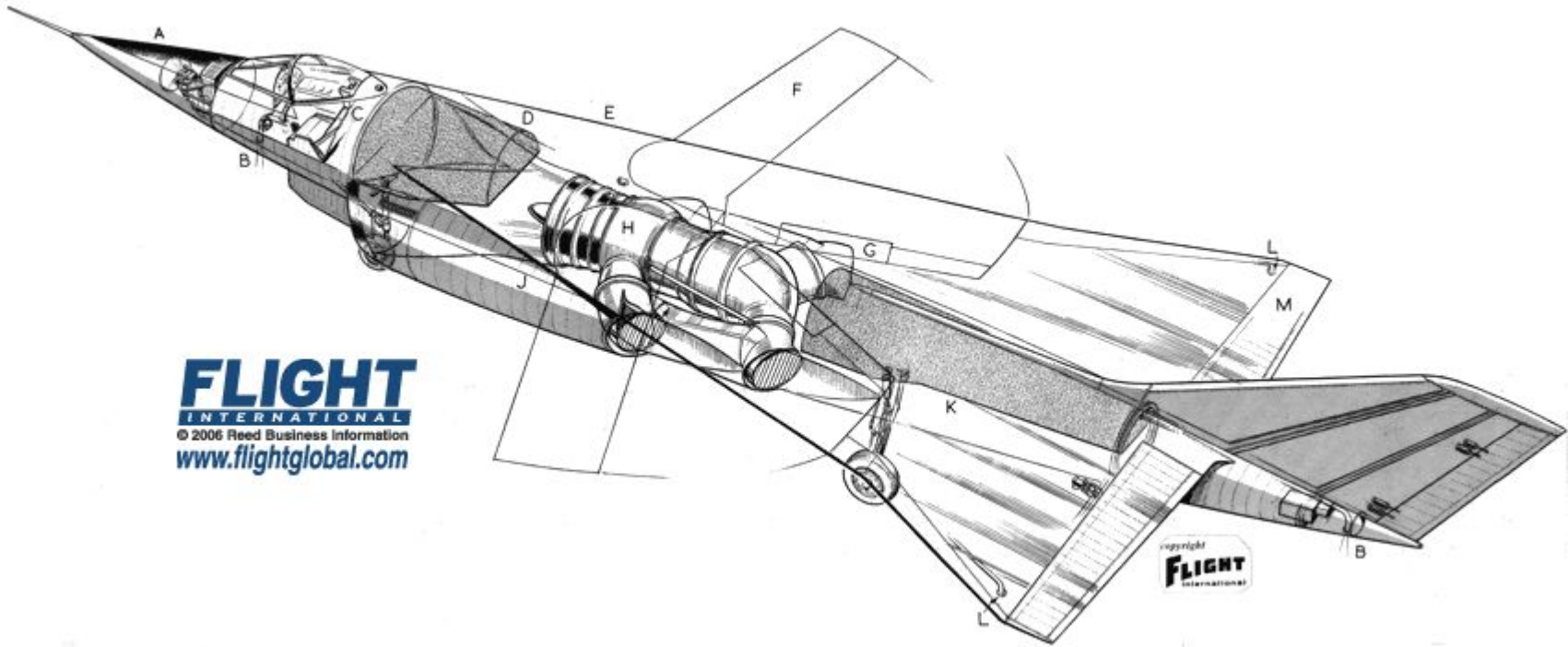
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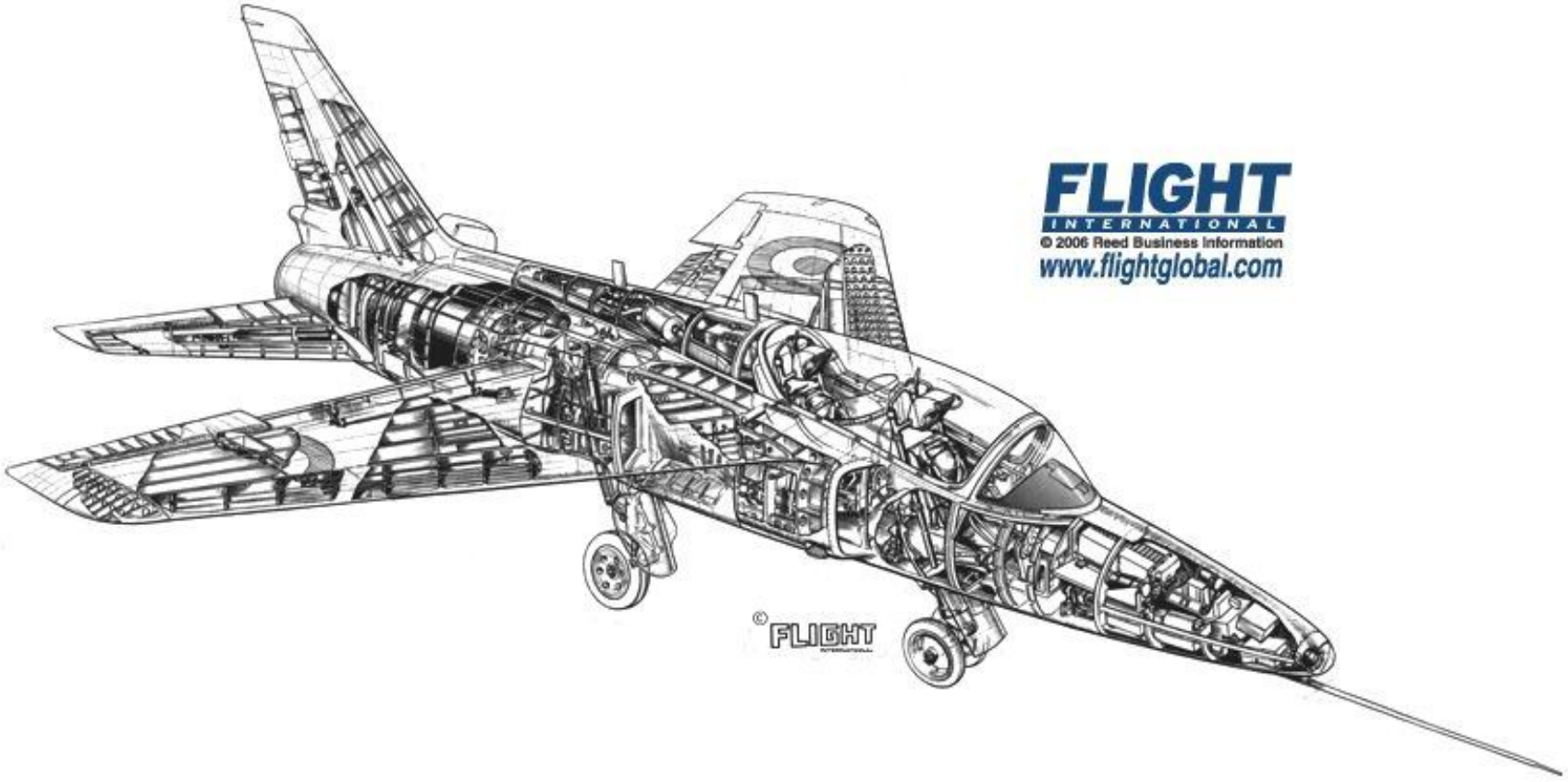

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Winglets
Aileron trimtab
Full-cantilever torsion-cell structure wing
Overwing filler point
Single-slotted flaps
GRP composite material
GRP rear hinged bottom cowling
Dowty Rotol ARA-D 12ft dia composite propellers
Single slotted flaps
ADF 1 aerial
Luggage bins
VHF comm 1 aerial
Forward cargo compartment (114-7ft³)
Electrical power centre
Radio rack
Maintenance and test panel
Aramid composite material
Toilet compartment
Pratt & Whitney Canada PW124 engines
Forward pressure bulkhead
Passenger entry door and retractable airstairs
Three-tube design nose gear
Main landing gear with double-acting shock absorber
Pneumatic de-icing boots
VHF nav 1 and nav 2 aerial
Three-spar fin structure with bonded skin/stringers
Rudder trimtab
Two spar horizontal stabiliser
Rudder balance tab
HF Comm 1 and 2 aerials
Rudder provided with gust locks
Aft cargo compartment (161-5ft³)
Elevators provided with gust locks
Air conditioning pack
Rear pressure bulkhead
Galley
Emergency and cargo door
Nacelle centre section of monocoque construction
Main fuel tanks useable capacity 5036 litres
Aileron spring tab
Ailerons provided with gust locks
Balance tab

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Gulfstream G650

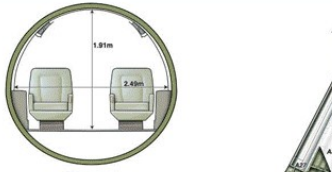
Honeywell

Rolls-Royce

Gulfstream
A GENERAL DYNAMICS COMPANY



Instrument panel and central console



Cabin cross section

Structure and general

1 Glassfibre honeycomb construction, upward hinged radome
2 Titanium birdstrike barrier panels
3 Forward pressure bulkhead
4 Curved two-piece windscreen, electrically de-iced
5 Two fixed cockpit side windows (one each side of aircraft) electrically defogged
6 Two-crew cockpit with seat for third crew member
7 Instrument panel housing four 13 x 10in (330 x 254mm) liquid crystal displays
8 Overhead panel
9 Pilot's LCD head-up display
10 Pedestal
11 Side consoles
12 Fuselage is of an all-metal semi-monocoque construction with bonded, clad aluminium alloy skin, frames and stringers. The fuselage consists of a nose section, forward mid-section,centre section,aft mid-section and tail section
13 Air stair door, hydraulically actuated
14 Graphite/thermoplastic composite floorboards – Stork Fokker Aerostructures
15 Machined aluminium alloy floor beams and seat track rails
16 Sixteen elliptical windows – 523 x 714mm. The windows are constructed of stretched acrylic (inner) and new craze resistent polymer (outer) panes. These are acoustically isolated from the inner heated pane – PPG Aerospace.
17 Window mounting structure
18 Four window emergency exits, can be opened from inside and outside the aircraft – 660 x 812mm
19 Auxiliary pressure bulkhead – graphite/epoxy composite construction
20 Baggage compartment door, opens inward and upward
21 Rear pressure bulkhead – graphite/epoxy composite
22 Tailcone – glassfibre honeycomb construction
23 Dorsal strake
24 Fin consists of three machined spars joined by machined/cherdwise ribs. The aluminium alloy chemically etched skin panels with bonded aluminium alloy doublers and stringers are rivetted to the ribs and spars – Stork Fokker Aerostructures
25 Pivot point for tailplane
26 Tailplane consists of tip to tip upper and lower skins with left and right beams joined at the front, centre and rear spars – complete tailplane manufactured by Stork Fokker Aerostructures
27 Front spar – graphite/epoxy construction
28 Rear spar – graphite/epoxy construction
29 Centre spar – machined aluminium alloy
30 Machined aluminium alloy ribs
31 One-piece aluminium alloy leading edge
32 Pressed aluminium alloy leading edge ribbets
33 Tailplane tip – aluminium alloy chemically etched skin and pressed aluminium alloy ribs with moulded trailing edge
34 Single piece graphite/epoxy upper and lower skins with integral sparwise stringers. Access panels in upper skin
35 Fin centrebox
36 Fin fairing
37 Aluminium alloy support structure for fuselage to wing fairing
38 Fibreglass and carbon/epoxy composite fuselage-wing fairings (WTBF)– Nordam
39 Fuselage to wing attachment points
40 Main frames connecting wing to fuselage
41 Wing is in two sections joined at the centreline and mounted under the lower fuselage – wing box manufactured by Spirit Aerosystems
42 Forward wing centre box – aluminium alloy
43 Machined two-piece front spar – aluminium alloy
44 Machined two-piece rear spar – aluminium alloy
45 Machined shear web-type ribs – aluminium alloy
46 Machined one-piece aluminium alloy upper wing skin with rivetted stringers
47 Machined three-piece aluminium alloy lower wing skin with rivetted stringers – access ports for wing box access
48 Carbon/fibre composite wing trailing edge panels
49 Wing leading edge in five sections – aluminium alloy
50 Winglets – graphite fibre and aluminium beam construction
51 Storage cabinets
52 Passenger cabin
53 Single passenger seats
54 Double passenger seats
55 Divan
56 Fold-down passenger tables – two off. Only one table shown folded out
57 Conference table
58 Credenza
59 Cabin window ledges
60 Ledge side panels
61 Cabin window shades
62 Upper sidewall panels
63 Cup holders
64 Crew rest area
65 Crew/passenger lavatory
66 Galley area – both sides
67 Passenger lavatory
68 Baggage compartment

Avionics, electrics and sensors

A1 Weather radar antenna – Honeywell
A2 EVS IR camera
A3 Glideslope antenna
A4 Multi-function probes (MFP) – four off
A5 Ice detector probes – two off
A6 TCAS antenna
A7 Total air temperature probes – two off
A8 Flat screen cabin monitor
A9 Left hand avionic equipment rack
A10 Right hand avionic equipment rack
A11 ATC 1 antennas
A12 ATC 2 antennas
A13 ADF antenna
A14 VHF 1 antenna
A15 VHF 2 antenna
A16 VHF 3 antenna
A17 GPS antenna – two off
A18 Wing inspection light
A19 Baggage electric and avionics bay
A20 UHF security system antenna
A21 ELT antenna
A22 Marker beacon antennna
A23 FCS EBHA PDB
A24 HF 1 R/T
A25 HF 2 R/T
A26 HF antenna couplers
A27 HF antenna
A28 Dual magnetometers
A29 Junction box – two off
A30 Satellite data unit
A31 40amp-hr, Lithium Ion 24vdc batteries – two off
A32 60 Hz converter 1
A33 Static discharge wicks
A34 60 Hz converter 2
A35 Side view SD cameras
A36 VOR/LOC glideslope antenna
A37 Broadband multi link antenna
A38 Direct TV antenna
A39 Camera
A40 Navigation/anticollision light
A41 Logo lights
A42 Forward fixed fully sealed HID landing light modules integrated into the wing to fuselage fairing – two off
A43 Three sealed beam taxi lights
A44 Navigation and strobe lights
A45 Satcom antenna
A46 RADALT antennas – four off. Positioned under wing to WTBF
A47 DME antenna – two off
A48 TCAS antenna
A49 Flight data recorder/cockpit voice recorder
A50 Air cell antenna

Flying controls

C1 Rudder pedals – Rockwell Collins
C2 Control column – Rockwell Collins
C3 Aluminium alloy aileron control surfaces – manufactured by Spirit Aerosystems
C4 Spoilers – three per wing inboard – speedbrake/ground spoiler
Midboard – speedbrake/ground spoiler/roll spoiler
Outboard – speedbrake/ground spoiler/roll spoiler – manufactured by Spirit Aerosystems
C5 Fly-by-wire aileron actuators – two per aileron. One EHSA and one EBHA activelactive operation – Parker Aerospace
C6 Fly-by-wire spoiler actuators – one per spoiler panel. One EHSA per inboard and midboard panel. One EBHA per outboard panel – Parker Aerospace
C7 Aluminium alloy single-slotted Fowler-type flaps (one flap per wing) manufactured by Spirit Aerosystems
C8 Flap tracks – four per flap surface
C9 Flap actuators – two flaps per surface. Actuators interconnected via a rigid transmission drive system and powered by a hydraulically powered drive unit mounted within the wheel well area – manufactured by Moog
C10 Torque tube driveline connecting the hydraulic drive unit to the flap actuators – manufactured by Moog
C11 Tailplane trim actuator – electrically powered – manufactured by Rockwell Collins
C12 Elevator of graphite/epoxy composite construction, the elevators are mounted on hinges attached to the tailplane rear spar – manufactured by Stork Fokker Aerostructures
C13 Rudder of graphite/epoxy composite construction, mounted on hinges attached to the fin rear spar – Stork Fokker Aerostructures
C14 Fly by wire rudder actuators – total of two. One EHSA and one EBHA – activelactive operation – Parker Aerospace
C15 Fly by wire elevator actuators – two per elevator. One electro hydraulic servo actuator (EHSA) and one electro backup hydrostatic actuator (EBHA) – activelactive operation – Parker Aerospace

Environmental control system

E1 Conditioned air ducting
E2 Conditioned air ducting
E3 Conditioned air ducting to cockpit
E4 Conditioned air to cabin
E5 Cabin floor level ducting for conditioned air
E6 Cabin return air
E7 Cockpit air outlets
E8 Crew and passenger oxygen bottles – two off
E9 Fan bleed air
E10 Engine bleed air ducting
E11 Twin air conditioning packs – Honeywell
E12 Ram-air inlet
E13 Ozone converter
E14 Gaspar supply
E15 Precooler
E16 Air conditioning ducting
E17 Ram air supply duct
E18 Air conditioning pack exhaust
E19 Aft compartment vent
E20 Ducting to wing anti-ice
E21 Piccolo tubes in wing leading edge
E22 Overboard exhaust

Fuel system

F1 Two integral wing tanks. The integral tanks are baffled to minimise aircraft centre of gravity shift with changes in aircraft attitude. Each integral tank contains a hopper in which the pumping system for each wing is located. Adequate fuel quantity in each hopper is maintained during flight by gravity supplemented by ejector pumps which pump fuel from tank areas outside of the hopper. A cross flow line, connecting the two pumping systems, is provided to allow fuel to flow from one tank to either or both engines. A cockpit controlled intertank valve permits fuel balancing in flight. The fuel system for both engines are self-bleeding to minimise maintenance
F2 Main fuel line to engine
F3 Top hat section fuel vents
F4 Gravity filler point – on each wing

Powerplant, APU, pylon and nacelle

P1 Pylons constructed of graphite/epoxy composite ribs and skins and aluminium alloy leading edge, top surface of pylon designed to withstand walking loads
P2 Rolls-Royce – BR700-725A1-12 turbofan engines
P3 Nacelle air intake – carbon/fibre composite with aluminium alloy lip skin. All nacelle components produced by Spirit Aerosystems
P4 Cowl doors of carbon/fibre composite – both cowl doors hinge for access to engine
P5 Forward engine mount
P6 Aft engine mount
P7 Thrust strut
P8 Target type thrust reverser – hydraulically actuated – Spirit Aerosystems
P9 Thrust reverser doors
P10 Fire extinguisher bottles
P11 Honeywell RE220 auxiliary power unit

Undercarriage and hydraulics

U1 Hydraulically actuated nose undercarriage manufactured by Goodrich. Nose wheel steering supplied by Eaton
U2 Graphite/epoxy composite nose undercarriage doors, forward doors are shown open, they are normally closed when the undercarriage is down and locked
U3 Wheels, brakes and anti-skid system supplied by Meggitt
U4 Hydraulically actuated main undercarriage manufactured by Goodrich
U5 Main undercarriage doors – graphite/epoxy composite. Manufactured by Nordam
U6 Main undercarriage fairing door, attached to and closes with main undercarriage leg – graphite/epoxy composite. Manufactured by Nordam
U7 EHSA/EBHA hydraulic control manifolds and remote electronics for aileron actuation – Parker Aerospace
U8 EHSA/EBHA hydraulic control manifolds and remote electronics for spoiler actuation – Parker Aerospace
U9 EHSA/EBHA hydraulic control manifolds and remote electronics for elevator actuation – Parker Aerospace
U10 EHSA/EBHA hydraulic control manifolds and remote electronics for rudder actuation – Parker Aerospace
U11 Ram air turbine – on stbd side of aircraft – Hamilton Standard
U12 Bottles for emergency extension of undercarriage
U13 Radial main landing gear tyres – Goodyear
U14 Landing gear control
U15 Bias nose landing gear tyres – Goodyear

Instrument panel and displays

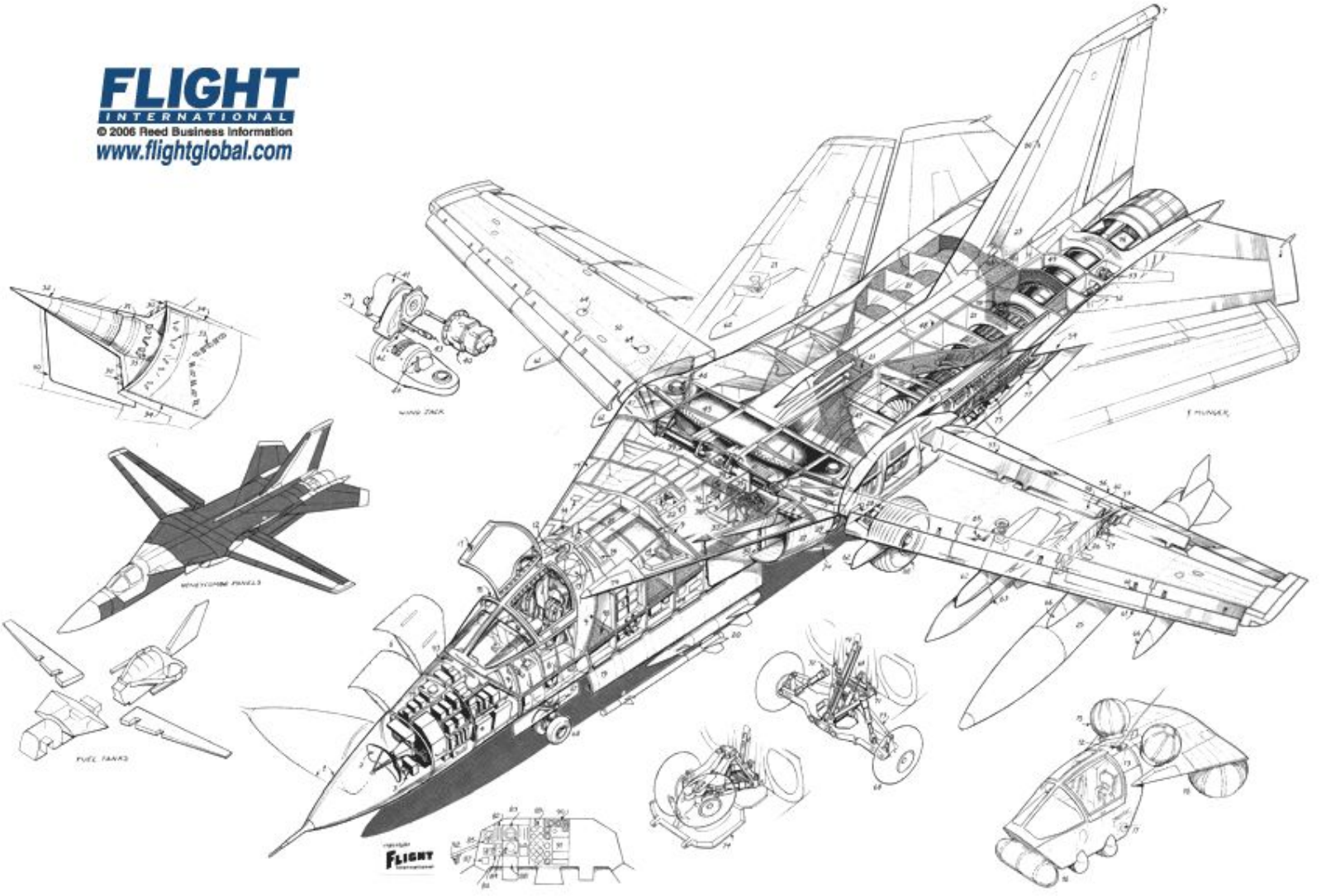
D1 Primary flight displays – Honeywell
D2 Multifunction displays – Honeywell
D3 Master warning panels
D4 Guidance panel – Honeywell
D5 Chronometers
D6 Switch panel units
D7 Fire extinguisher controls
D8 Standby multifunction controller – Honeywell
D9 Map display
D10 Landing gear controller
D11 Emergency gear extension handle
D12 Emergency locator transmitter switch
D13 Engine throttle and thrust reverser
D14 Nosewheel steering
D15 Parking brake handle
D16 Brake accumulator pressure indicator
D17 Trim control panel – pitch/yaw/roll
D18 Cursor control devices
D19 Multifunctional control display units – three off
D20 Ram air turbine deployment handle
D21 Audio control panel – three off
D22 Oxygen control panel
D23 Cockpit printer
D24 Flap handle
D25 Speed brake handle
D26 Cockpit handset
D27 Security system control panel
D28 Data loader
D29 Oxygen mask – two off
D30 Dimming panel – two off

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Georgia

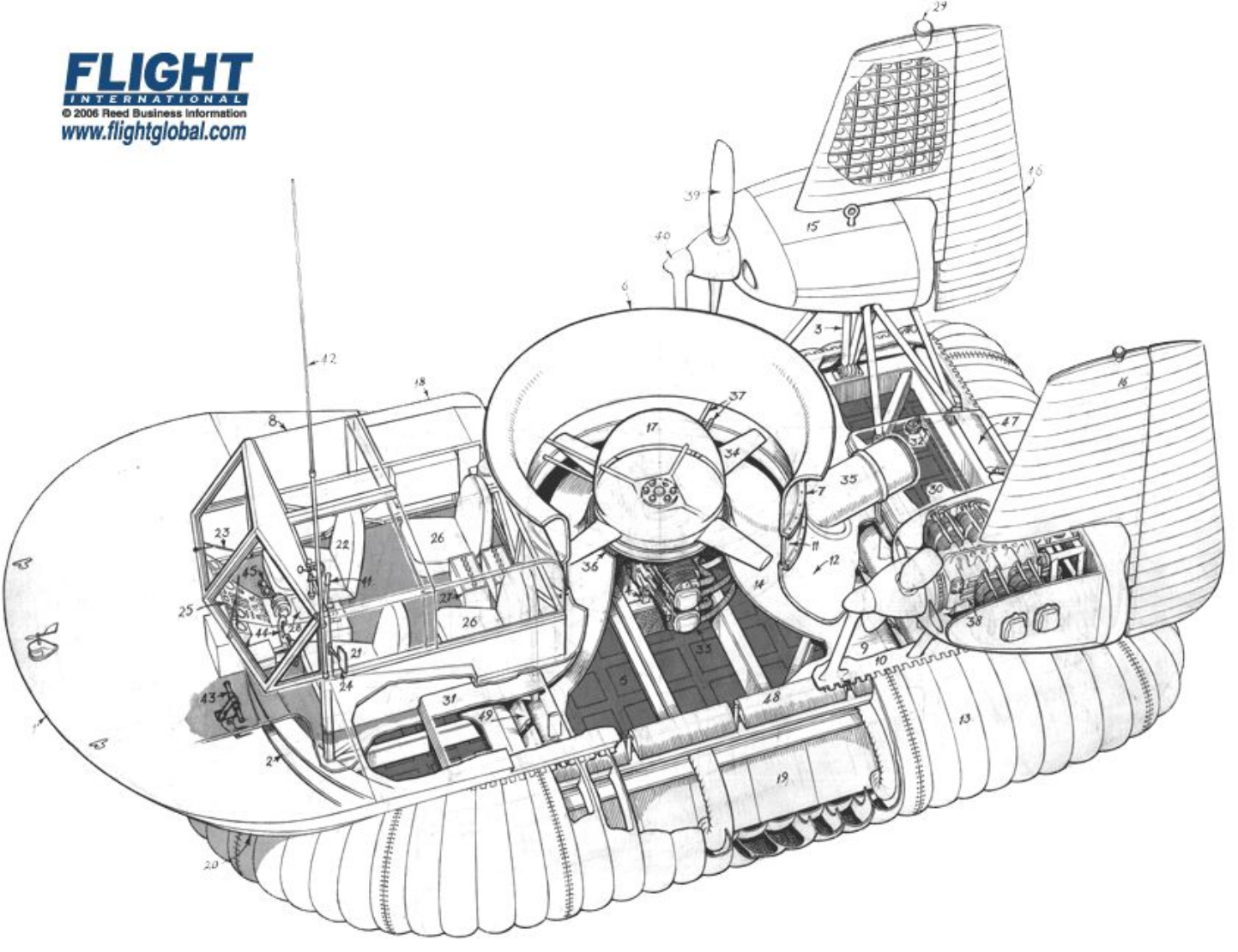
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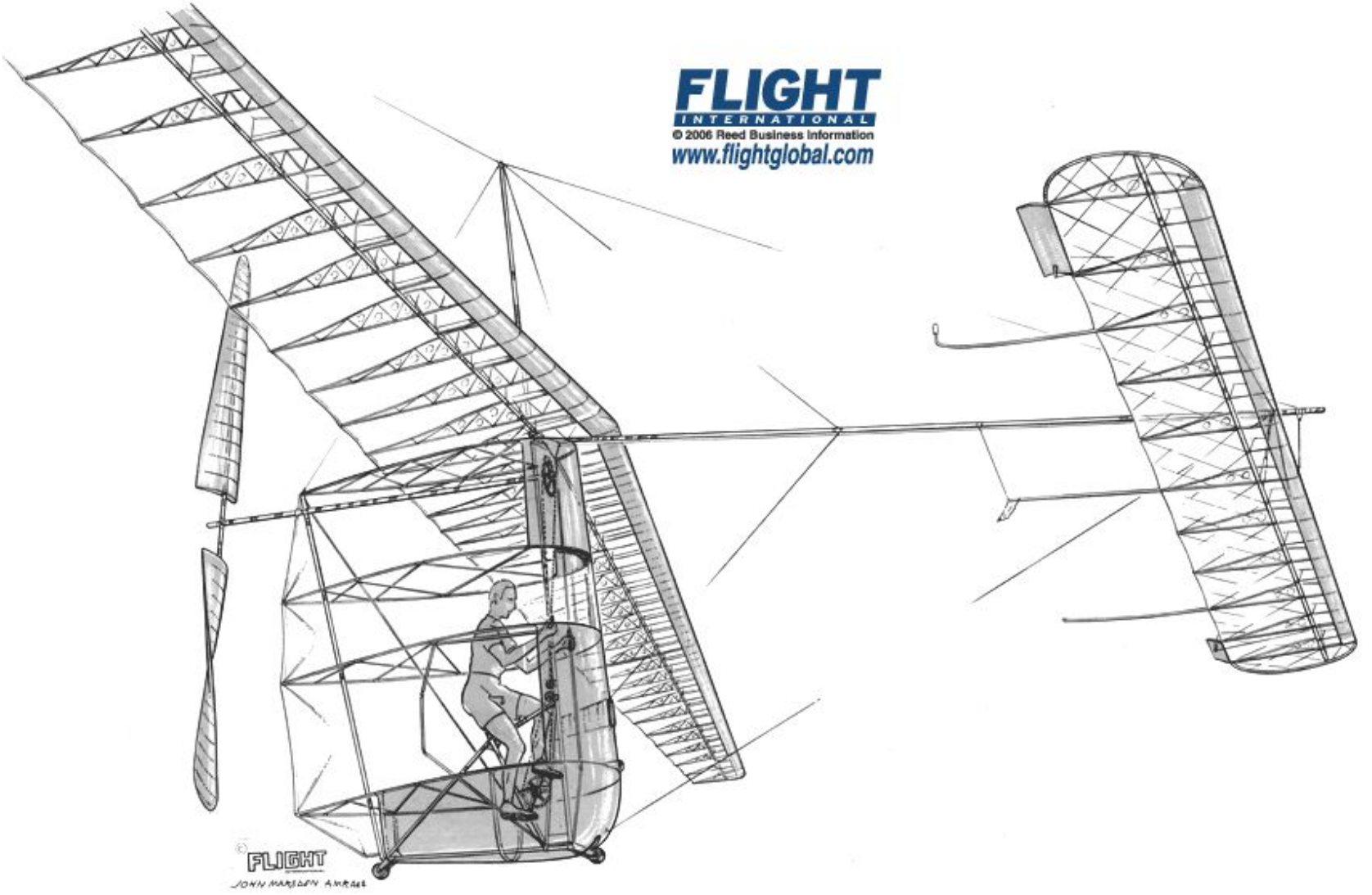
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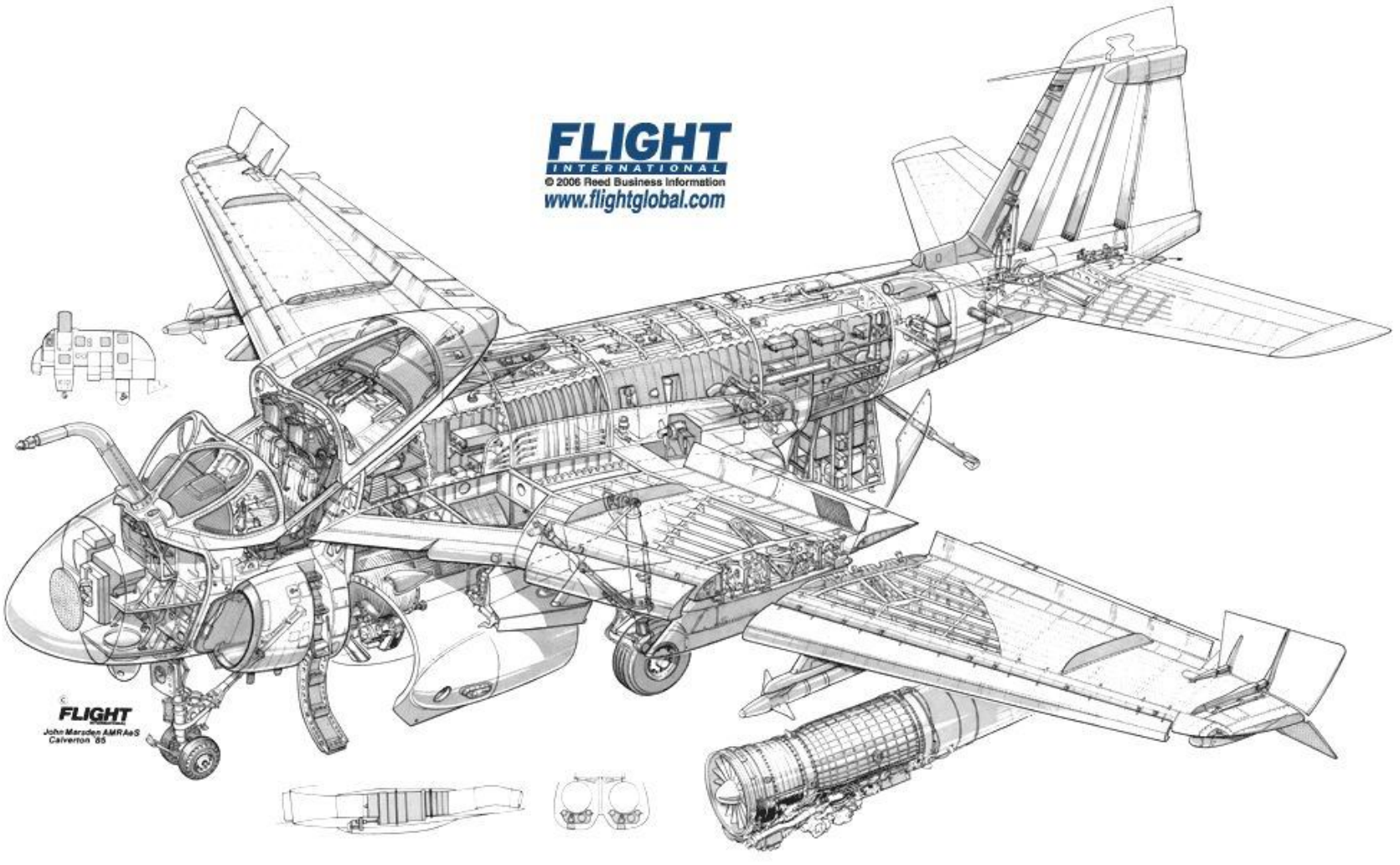


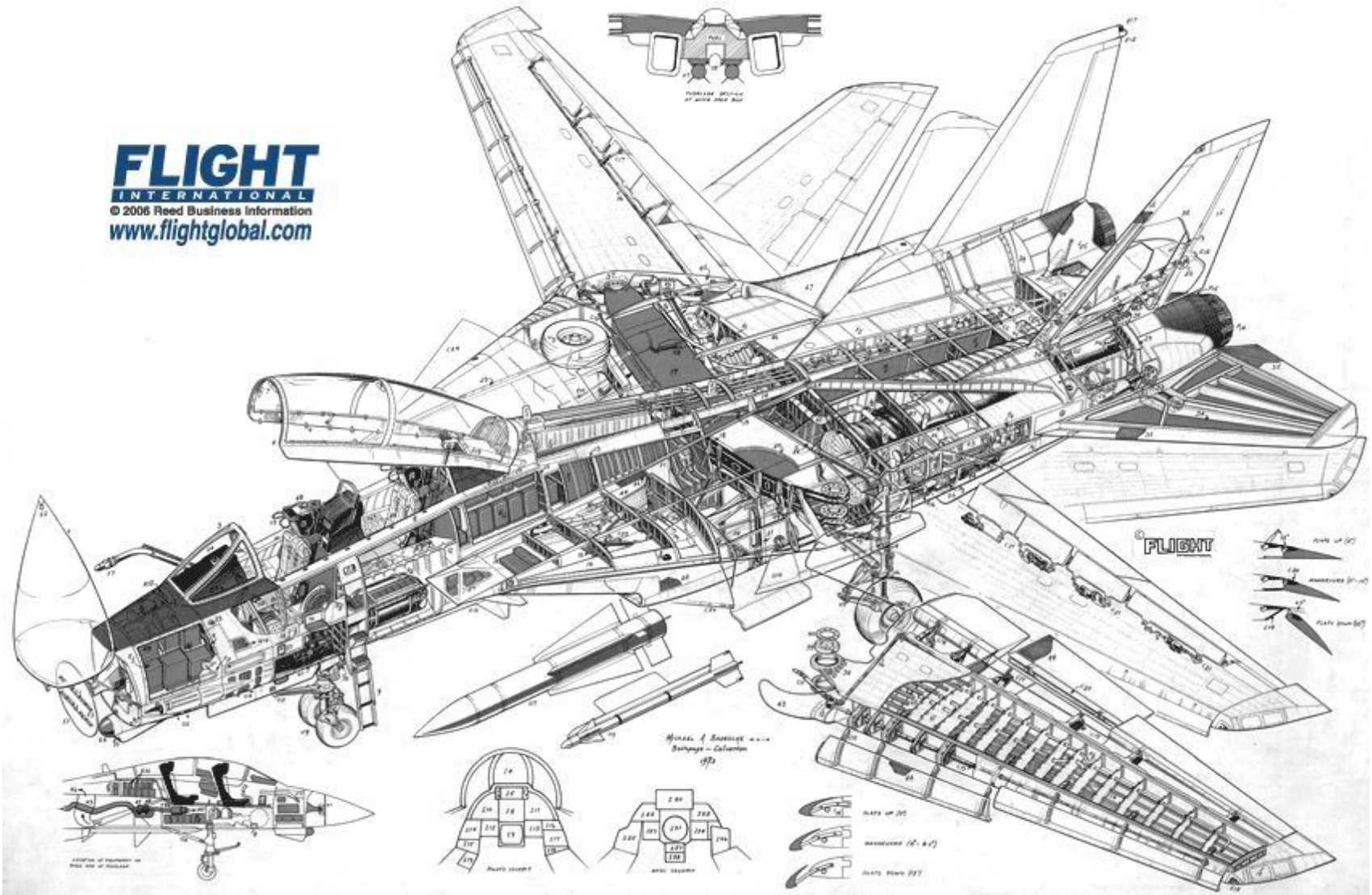
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Gulfstream G200

Gulfstream
A GENERAL DYNAMICS COMPANY

Pratt & Whitney Canada
A United Technologies Company



Cabin cross section

Structure and general

1 Monocoque pressure radome – glass-epoxy plastic with Nomex honeycomb core
2 Weather radar mounting bulkhead
3 Forward avionics bay (access both sides) – carbon/fibre with Nomex honeycomb
4 Forward pressure bulkhead – built-up aluminium alloy
5 Two-crew cockpit, plus foldaway seat for a crew member – PECO Europe model 240 crew seat
6 Combined passenger entrance door 838m x 1.83m, plug type, free falling, dampened and closed electrically – may be opened and closed manually
7 Fuselage consists of three forward sections, wing carry-through section, fuel cell section and aft section, 60 metal semi-monocoque aluminium alloy construction – stringerless
8 Continuous through longerons (four-off) – extruded aluminium
9 Rolled "Y" section built-up aluminium alloy frames
10 Intercostals – channel section
11 Cabin windows, machined aluminium alloy frames – 15-off
12 Removable cabin floor panels – provide access to lower fuselage
13 Cabin central aisle 914 x 127mm deep. Secondary floor structure can be adjusted to 457mm wide to accommodate pre-cross composite seating
14 Continuous cabin seat rails – provide layout flexibility
15 Fully adjustable forward facing single seat (storage drawer in base) – three-off
16 Fully adjustable rearward facing single seat – storage drawer in base – three-off
17 Berthable Divan – 2.1m length. Three lower storage drawers
18 Foldaway tables – three-off
19 Forward coat wardrobe
20 Buffet, storage for chinaglass above, sink and cabinets below
21 Unit housing avionics racks
22 Convection oven and coffee maker, and entertainment console – behind cabin trim bulkhead
23 Emergency oxygen bottle (plug-type), can be opened from inside or outside
24 Cabin insulation and trim panels
25 Aft coat wardrobe
26 Spacious private toilet and washing facilities
27 Pressurised floor over undercarriage bay
28 Rear cabin pressure bulkhead – built-up frame with skin doubler insert
29 Fuselage fuel tank rear pressure bulkhead (built-up) incorporating access to fuel tank
30 Baggage compartment door and aerial 1.14m x .685m
31 Pressurised and heated, fully lined baggage compartment, incorporating shelves and cargo retaining net – 0.5m³ (130IP), approx
32 "Back-to-back" rear pressure bulkhead (built-up aluminium alloy), incorporating forward transverse engine support beam
33 Removable access panel to environmental control system
34 Machined up and machined frame, supporting rear transverse engine support beam
35 Drop-down access panel to rear baggage/APU bay – housing elevator controls
36 Fin spar attachment frames – machined, incorporating multi-bolt fastened fittings
37 Two-spar, fully cantilevered fin torque box, machined front and rear spars, covered with riveted stringers and etched aluminium alloy skin panels
38 Composite one-piece composite leading edge
39 Detachable fin tip – glass-reinforced plastic moulding
40 Fully trimming one-piece tailplane, continuous machined twin spars, covered with riveted stringers and aluminium alloy skin panels
41 Tailplane and elevator bracket support rib – machined
42 Leading-edge ribs – composite
43 Tailplane torsum – machined aluminium alloy fitting
44 Auxiliary power unit titanium tearpipe bulkhead
45 Vertical fins – aluminium alloy. Also fuel diverter channels added under fuselage
46 Machined wing/fuselage frames attachment fittings
47 "Cruciform" machined skin splice chordwise fitting
48 Machined two-spar, double-swept, continuous-wing torque box, sealed for tankage
49 Upper and lower, single-piece, integral stringer machined wing skins
50 Machined ribs – plain side outward facing
51 Central undercarriage trunnion support spar
52 Detachable aluminium alloy leading edge
53 Winglets, detachable single spar glass-reinforced plastic with full depth honeycomb-sandwich panels
54 Wing fairings glass-reinforced plastic sandwich panels
55 "Sharp beam" prevents fuel tank rupture in the event of an undercarriage-down failure
56 Fuselage area ruled in this section

Environmental control system

A1 Emergency oxygen bottle capacity 3.22m³
A2 Electrically heated cockpit windows
A3 Engine low-pressure (LP) and high-pressure(HP) bleed air
A4 Potable water tank – 34 litre capacity
A5 Emergency heat exchanger exhaust duct
A6 Ram-air inlet duct
A7 Ram-air duct to air cycle machine
A8 Air cycle machine, provides conditioned air to cabin / controls temperature and pressurisation
A9 Main-air duct ventilation system – fade-out for low altitude
A10 Riser duct to overhead cabin supply and gaspers
A11 Forward cabin and cockpit supply duct
A12 Cabin side wall air outlets
A13 Cockpit overhead outlet
A14 Cockpit side and foot level outlets
A15 Cockpit windows demist outlet
A16 Spray ring for engine inlet anti-icing
A17 Access panel to anti-ice system in nacelle inlets
A18 Bleed-air from auxiliary power unit to environmental control system (ECS)
A19 Wing leading-edge slats de-icing pneumatic boots
A20 Krueger flaps pneumatic boots
A21 Horizontal tailplane leading-edge pneumatic boots
A22 Engine inlet cowl bleed air for anti-icing

Flying Controls

C1 Adjustable rudder pedals with toe brakes
C2 Control columns with trim switches on yokes
C3 Aileron control quadrant
C4 Aileron linkage to mixer and aileron disconnect
C5 Autopilot motor – aileron
C6 Push-pull rods out to aileron actuator via guide sleeves
C7 Aileron dual hydraulic actuator (can be manually operated in the event of total hydraulic failure) – movement 19° up, 15° down
C8 Leading-edge slat – aluminium alloy with glass – reinforced plastic/honeycomb honeycomb
C9 Slat linear actuators – movement 25° fully out
C10 Flexible drive shaft to linear actuators – four per wing
C11 Slat guides and tracks – six per wing
C12 Krueger flap actuated by hydraulic ram – movement 115° fully out
C13 Aileron – composite
C14 Single slotted Fowler-type flaps (two per wing) – movement 10°/20° take –off, 40° landing
C15 Flap linear actuators, one per inboard section, two per outboard section
C16 Flexible drive via single electric drive unit (situated in undercarriage bay). System stops automatically if asymmetry mode is detected
C17 Flap tracks and guides
C18 Flap guide fairings – glassfibre reinforced plastic
C19 Air brake panels (four per wing) serve as speed brakes in flight, and lift dumpers on landing (panels, skins and ribs – machined aluminium alloy)
C20 Air brake hydraulic actuators (four per wing) – movement 45° deployed
C21 Rudder control rods
C22 Elevator cables and rudder controls run up behind rotor trim panels
C23 Elevator quadrant – transfer cable to push-pull rods
C24 Elevator control rods to ballcrank
C25 Dual elevator hydraulic actuators (powered by two separate systems). Can be operated manually in the event of hydraulic failure
C26 Horizontal stabilizer electric trim actuator (dual motors) – movement 2.5° up, 5.5° down
C27 Horizontal stabilizer forward attachment scissors – three links per side
C28 Rudder manually operated. In the event of single-engine operation, a rudder trim system automatically assists the pilot (powered by engine bleed air) – movement 25° left, 25° right
C29 Rudder trim tab, operated by three electrical actuators – movement 10° left, 10° right
C30 Rudder mass balance
C31 Rudder skin of glassfibre-reinforced plastic with Nomex honeycomb sandwich and aluminium substructure. Rudder trim panel includes a Nomex substructure
C32 Elevator – skin glassfibre-reinforced plastic with Nomex honeycomb sandwich, spars and ribs (aluminium alloy) – movement – 27.5° trailing edge up, 20° trailing edge down

Avionics, electrics and sensors

E1 Colour weather radar antenna Collins/Rockwell RTA-858
E2 VHF Nav/ADF 1
E3 VHF comm 1
E4 DME 1
E5 ADC 1
E6 EGPWS
E7 GPS
E8 Radio altimeter
E9 DME1
E10 DFS
E11 Heated pitot heads – two-off
E12 Temperature angle of attack sensors – two-off
E13 Heated ice detector – two-off
E14 Rear avionics bay housing navigation, data equipment, flight data and voice recorders
E15 24V 40Ahr nickel-cadmium battery (both sides) – provision for third for cockpit battery (optional)
E16 External electrical power receptacle
E17 DC contactor box
E18 High intensity landing light
E19 Tail lights – two-off
E20 Wing inspection light
E21 External floodlight
E22 Upper anti-collision beacon
E23 Rear navigation light (white)
E24 Logo lights
E25 Navigation and strobe lights
E26 Static discharge wicks – glassfibre
E27 Static ports on port side – thermistor heated
E28 28V 400Ahr Thales starter/generators on each engine and APU – operate in parallel
E29 GPS number 2 antenna
E30 GPS number 1 antenna – standard
E31 Satcom antenna – optional
E32 Communication number 1 antenna
E33 ATC upper antenna
E34 ADF double antenna
E35 TCAS antenna
E36 Communication number 3 antenna
E37 ATC lower antenna
E38 DME number 2 antenna
E39 HGR/LOC antenna – both sides

Fuel system

F1 Two wing tanks each holding 1,010kg (2,360lb) of fuel
F2 Forward tank holding 812kg (1,790lb) of fuel
F3 Forward tank mounting lugs – also provide nominal gap between tank and aircraft fuselage to prevent chaffing
F4 Centre wing tank holding 1,008kg (2,660lb) of fuel, incorporated left and right feed tanks each holding 77kg (170lb) of fuel
F5 Fuselage tank holding 2,301kg of fuel (two part tank) approx holding 1,501kg (3,310lb) and lower holding 998kg (2,200lb)
F6 Single point pressure refuel point – nacelle/tank on right-hand side, opposite to fill
F7 Ram-air scoops (below wing) for fuel venting system
F8 Fuel vent line
F9 Fuel jettison line
F10 Overboard dump
F11 Tank and rigs
F12 Fuselage tank transfer pipes
F13 Tank venting lines
F14 Fuel probe (capacitance type)
F15 APU supply lines
F16 Engine supply at pylon

Powerplant, APU, pylon and nacelle

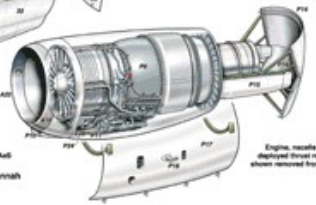
P1 Engine mount to pylon attachment fittings
P2 Engine centreline mount incorporating isolator fittings
P3 Rear engine mount and swivel lugs
P4 Titanium pylon firewall
P5 Pylon-constructed of aluminium alloy
P6 Pratt & Whitney Canada PW306A, two-spool turbofan engine, developing 6,040lb thrust at take-off
P7 Full-authority dual channel digital electronic control (FADEC) unit
P8 Engine inlet air total pressure and temperature probes
P9 Aluminium engine inlet cowl
P10 Generator cooling air inlet
P11 Generator hot air overboard outlet
P12 Engine auxiliary gearbox
P13 Oil filler and level sight glass
P14 Nordam target type thrust reverser (hydraulically actuated)
P15 Thrust reverser actuator fairing
P16 Reverser doors and fittings
P17 Engine cowling and doors – carbonfibre reinforced
P18 Engine drains mast
P19 Honeywell GTCP36-150(A6) APU
P20 Self-contained stainless-steel firewall
P21 APU three-point mounting brackets and isolators
P22 APU exhaust
P23 APU air inlet
P24 Fire-extinguisher bottles – two-off right-hand bottle has three outlets – one for APU
P25 Engine driven hydraulic pump (one for each engine) provides 3,000lbf/in² pressure to primary and secondary flight controls, landing gear, brakes, nose wheel steering and thrust reversers

Undercarriage and hydraulics

U1 Unpressurised nose landing gear leg – front doors close and rear door is open when leg is down
U2 Nose landing gear – forward retracting, hydraulically actuated
U3 Twin anti-piston electro-hydraulic steering system
U4 "Shock-by-wire" electronic control (steering handwheel (left side only). Steering angle from rudder pedals 7°±0.2°, and from handwheel 60°±1°
U5 Towing adapter – a 100° without disconnecting the torque links
U6 Main-gear pivot fairing and chining undercarriage doors
U7 Sideways unlocking trailing-link type undercarriage. Incorporating twin wheels with tubeless tyres, and anti-brakes
U8 Main landing gear actuator, hydraulically actuated – also locks main gear legs when undercarriage is down)
U9 Oleo pneumatic shock absorber
U10 Outer main gear door – doors operated via linkage to struts
U11 Pneumatic reservoir pre-charged to 3,000lbf/in² is for emergency extension of undercarriage
U12 Emergency hydraulic reservoirs for brakes, nose wheel steering and parking
U13 Hydraulic reservoirs. Two independent hydraulic systems (left and right) 3,000lbf/in². Also (not shown) is a separate manually driven pump
U14 Power brake valve housing
U15 Two nosewheels, Michelin tyres, size 18x4.4
U16 Twin mainwheels, Michelin tyres, size 26x6.6 R14


Instrument panel and central console


Detail showing position of "Skag Beam" under fuselage

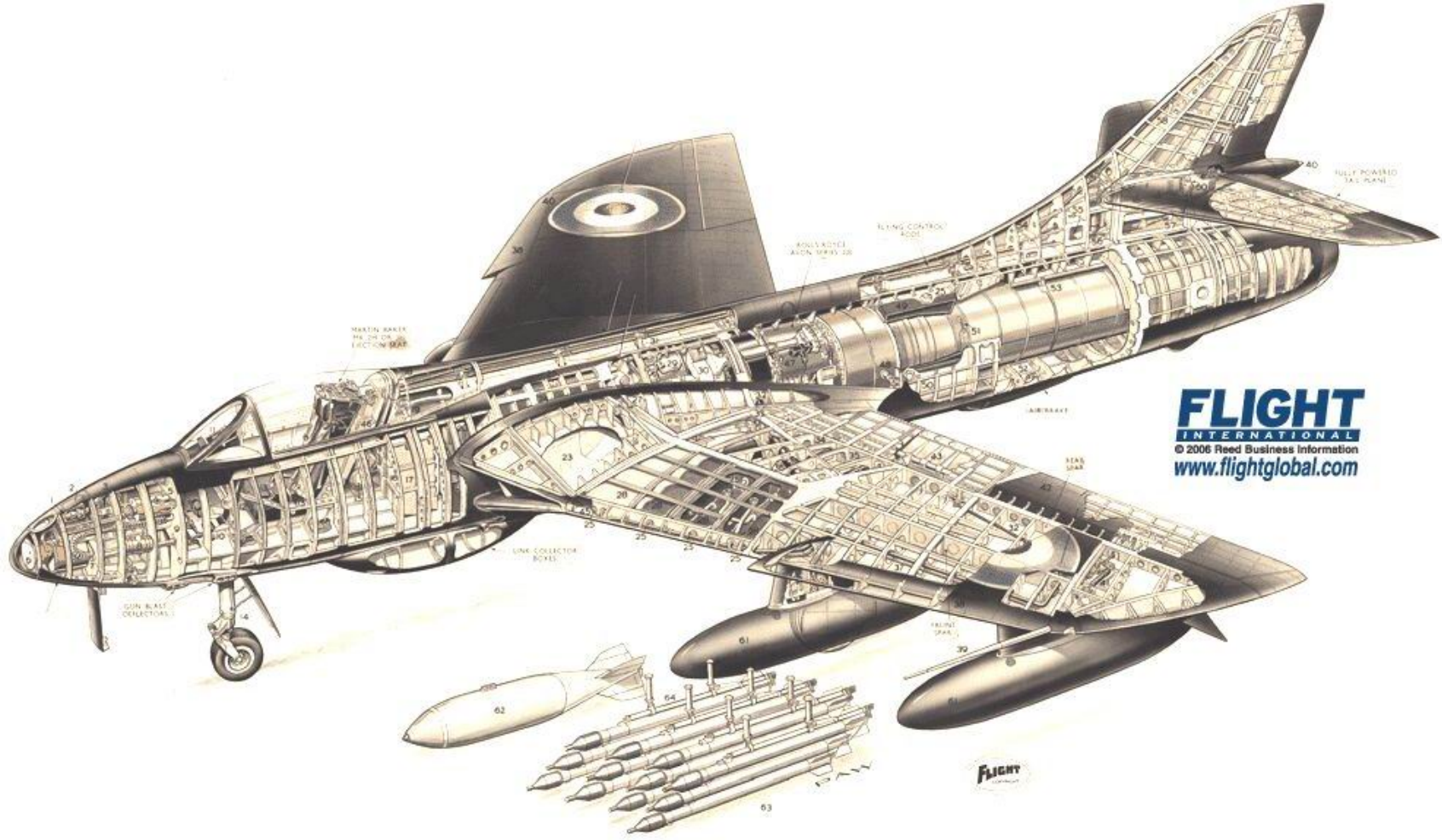

Engine, nacelle and deployed thrust reverser shown removed from aircraft

Tim Hall FRAeS
Tel Aviv,
Dallas & Savannah

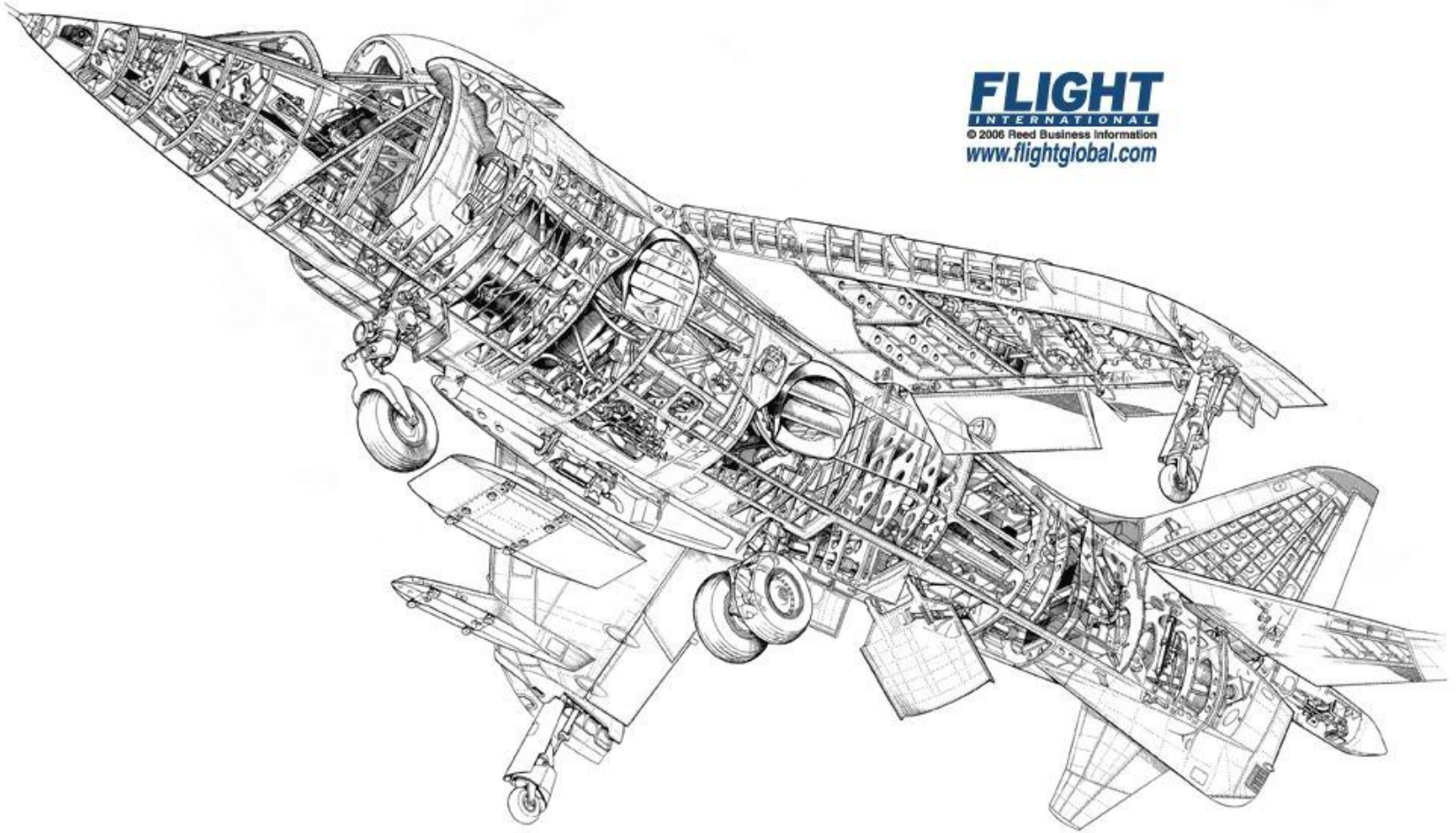
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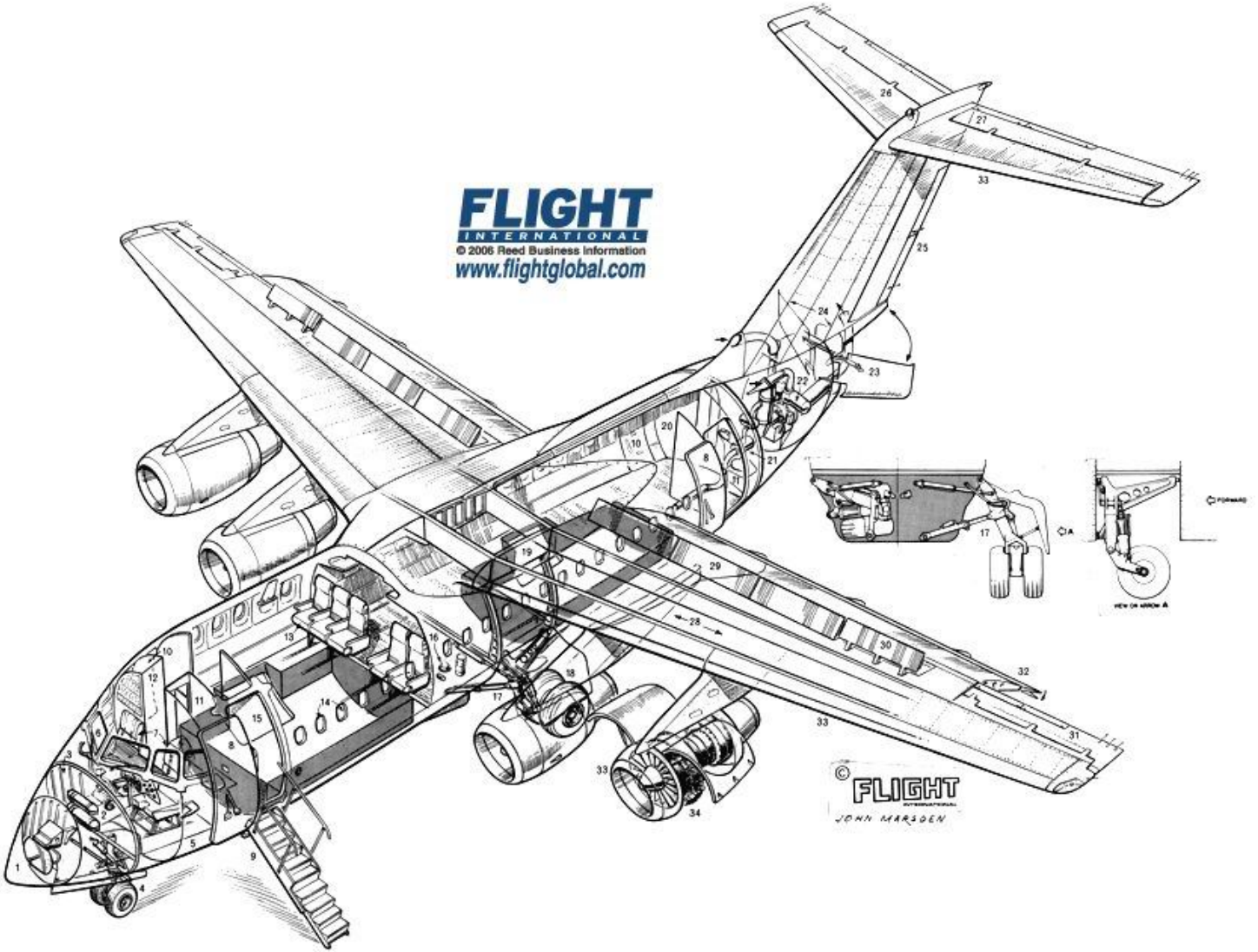
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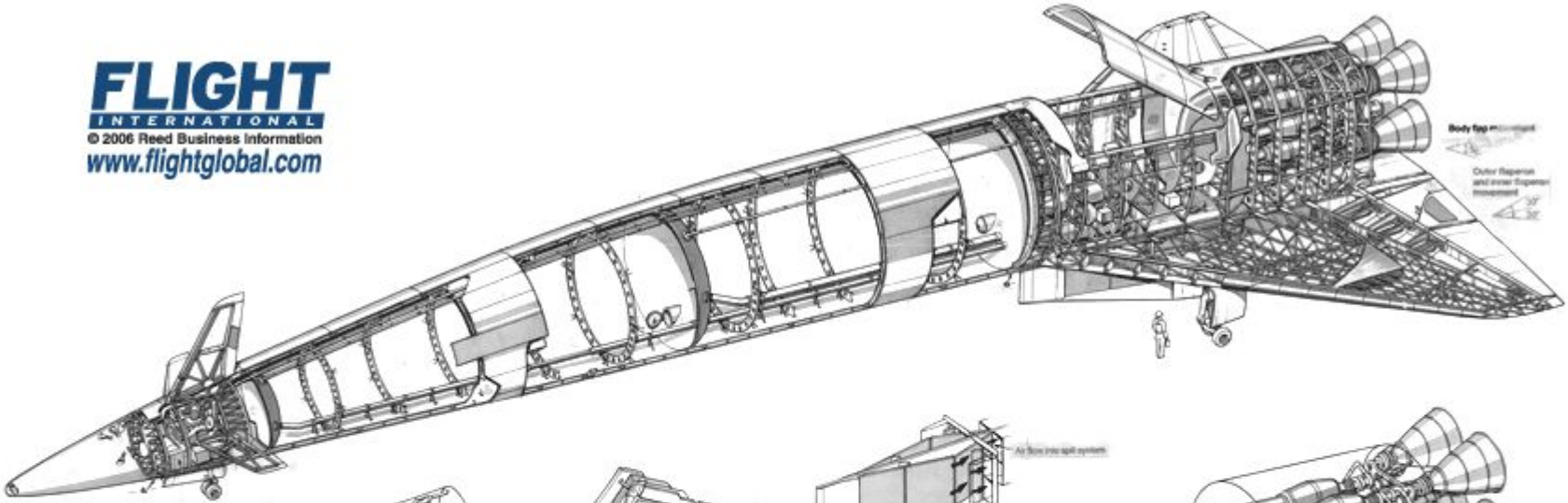

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HUNTER F6


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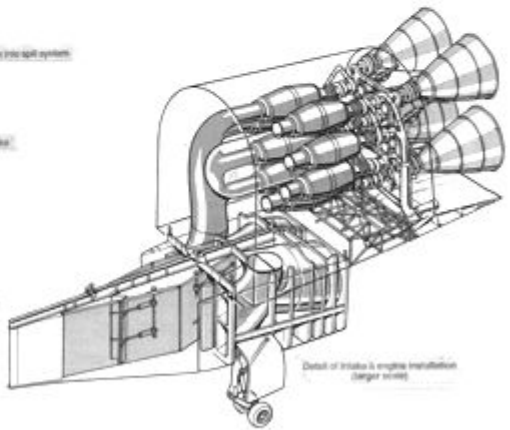
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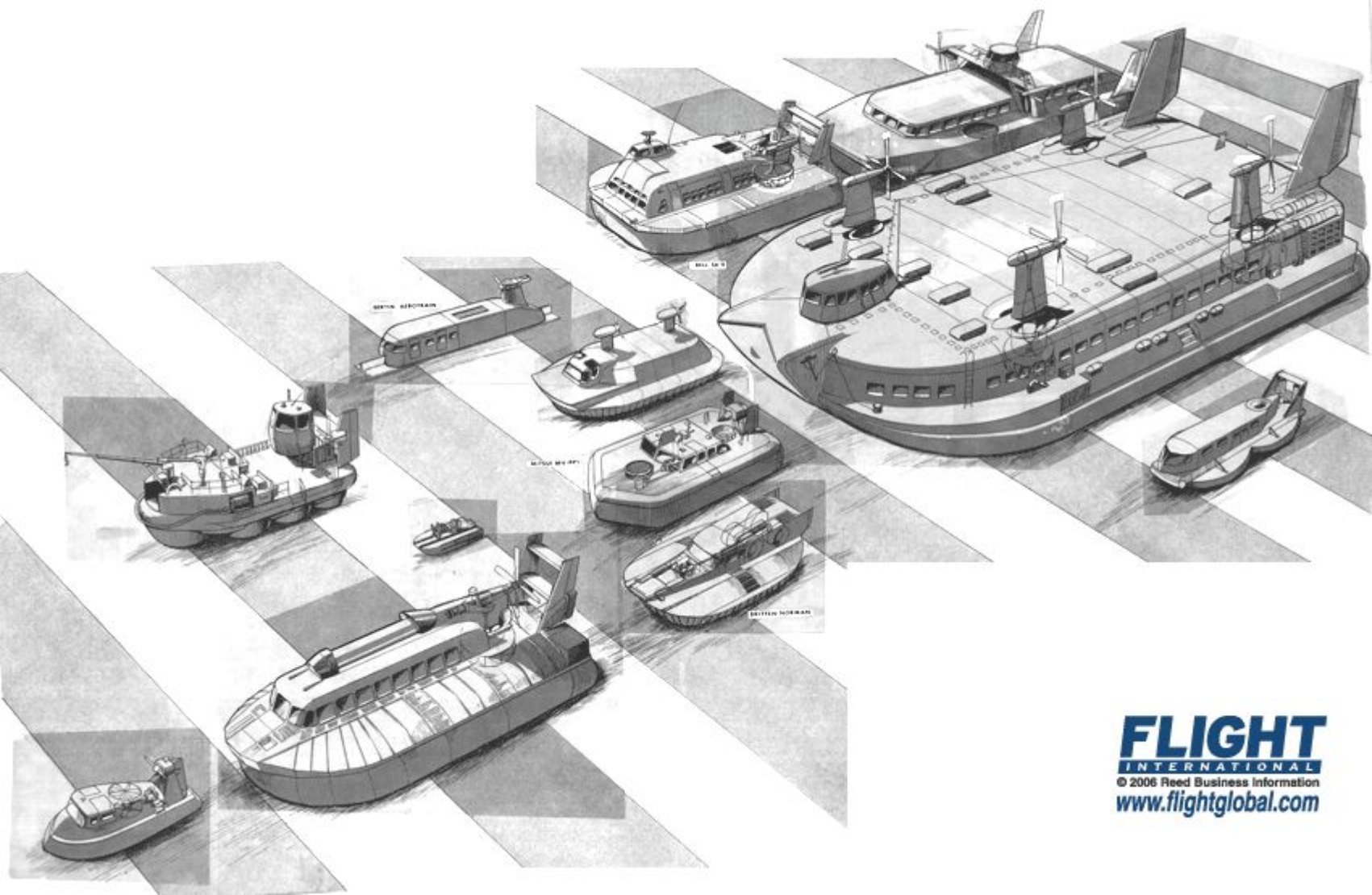




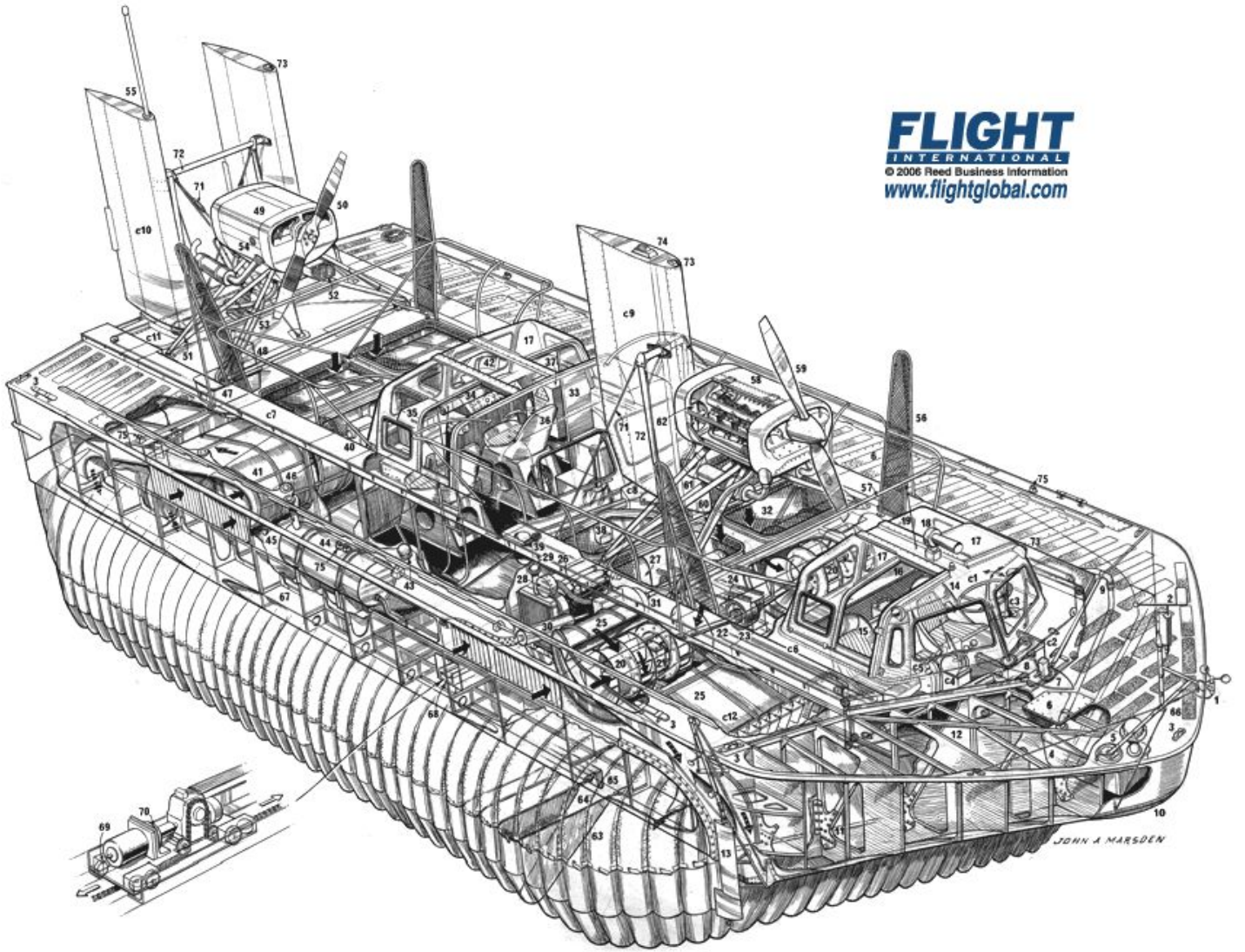




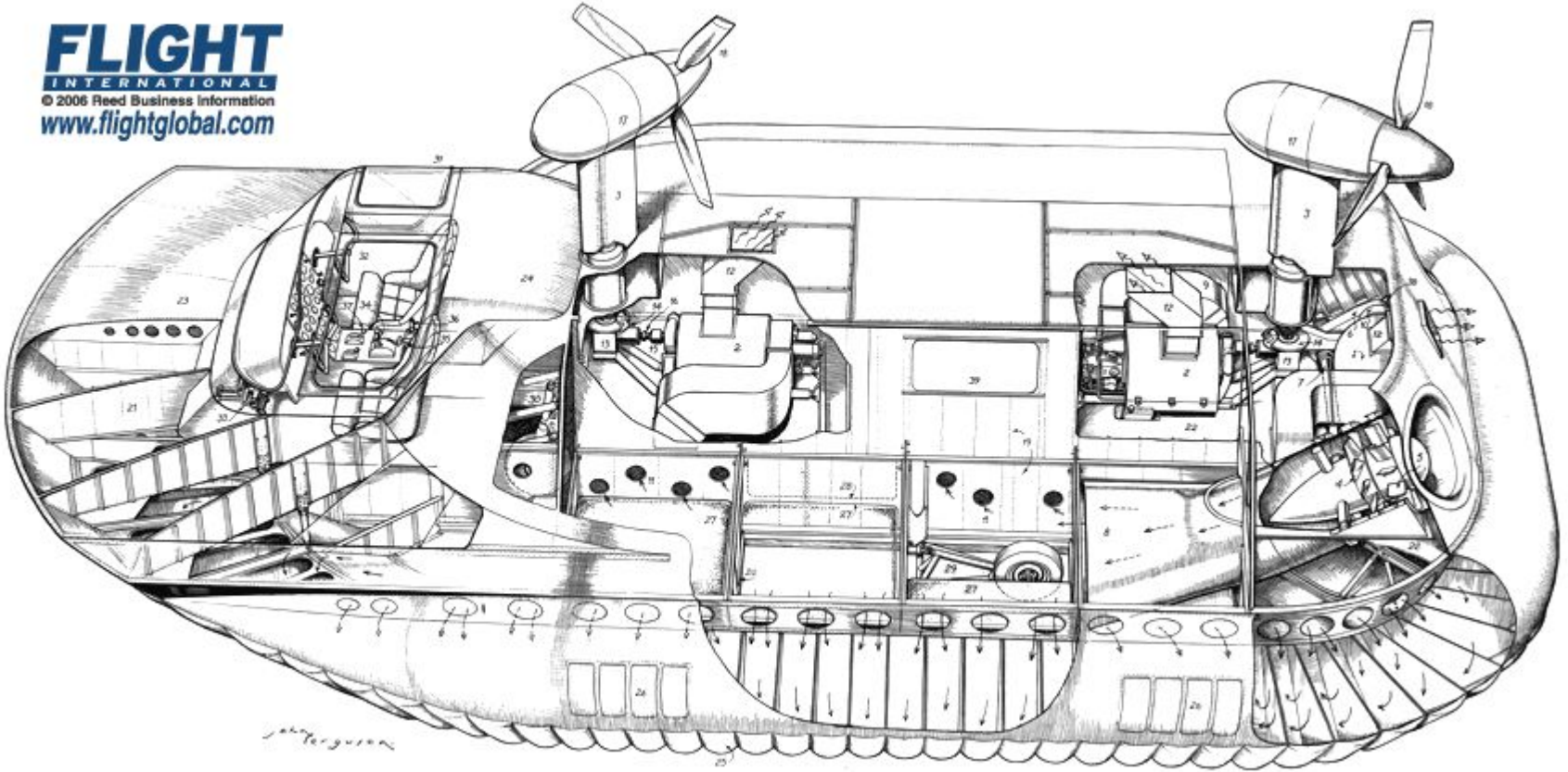


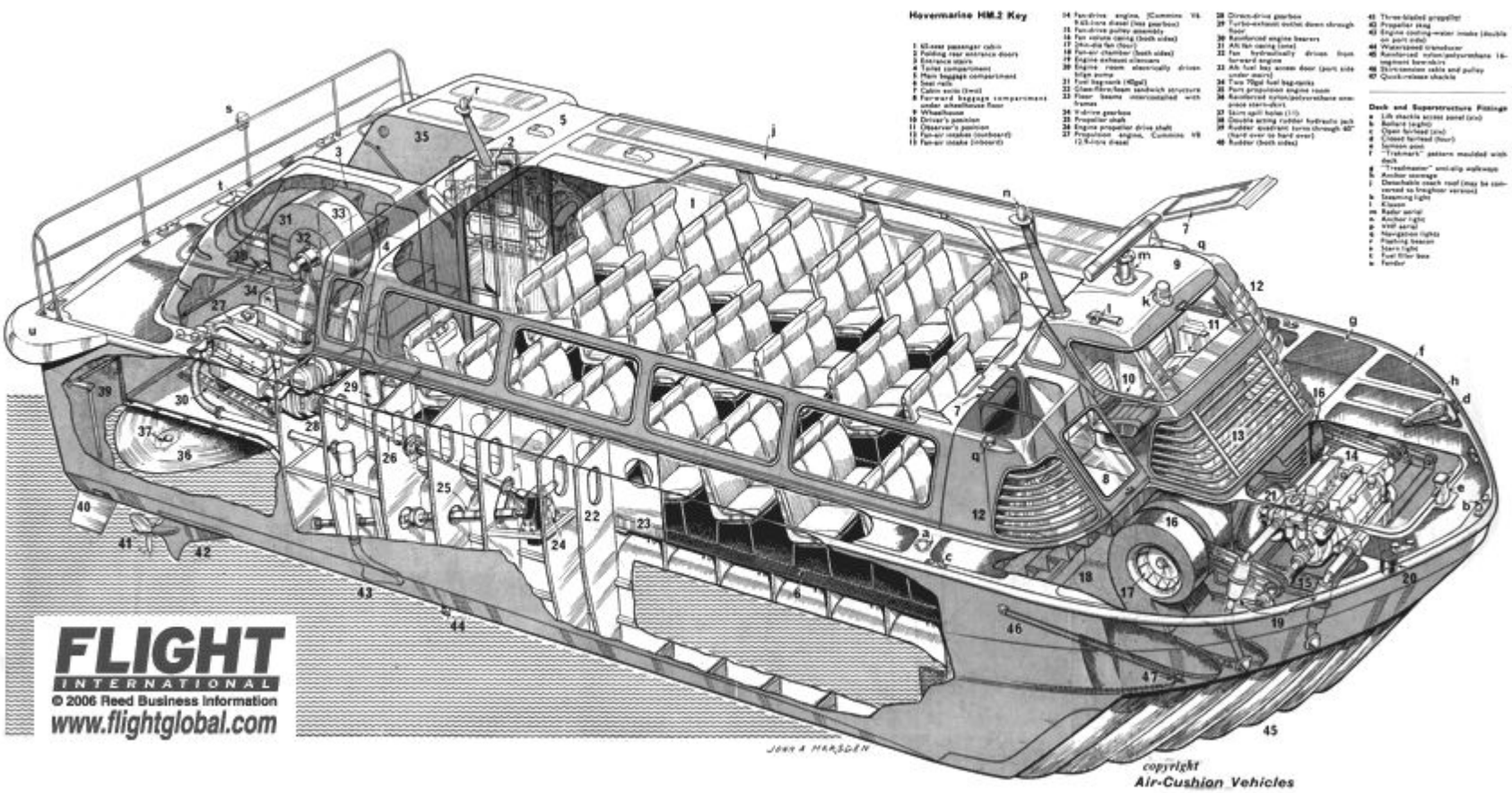


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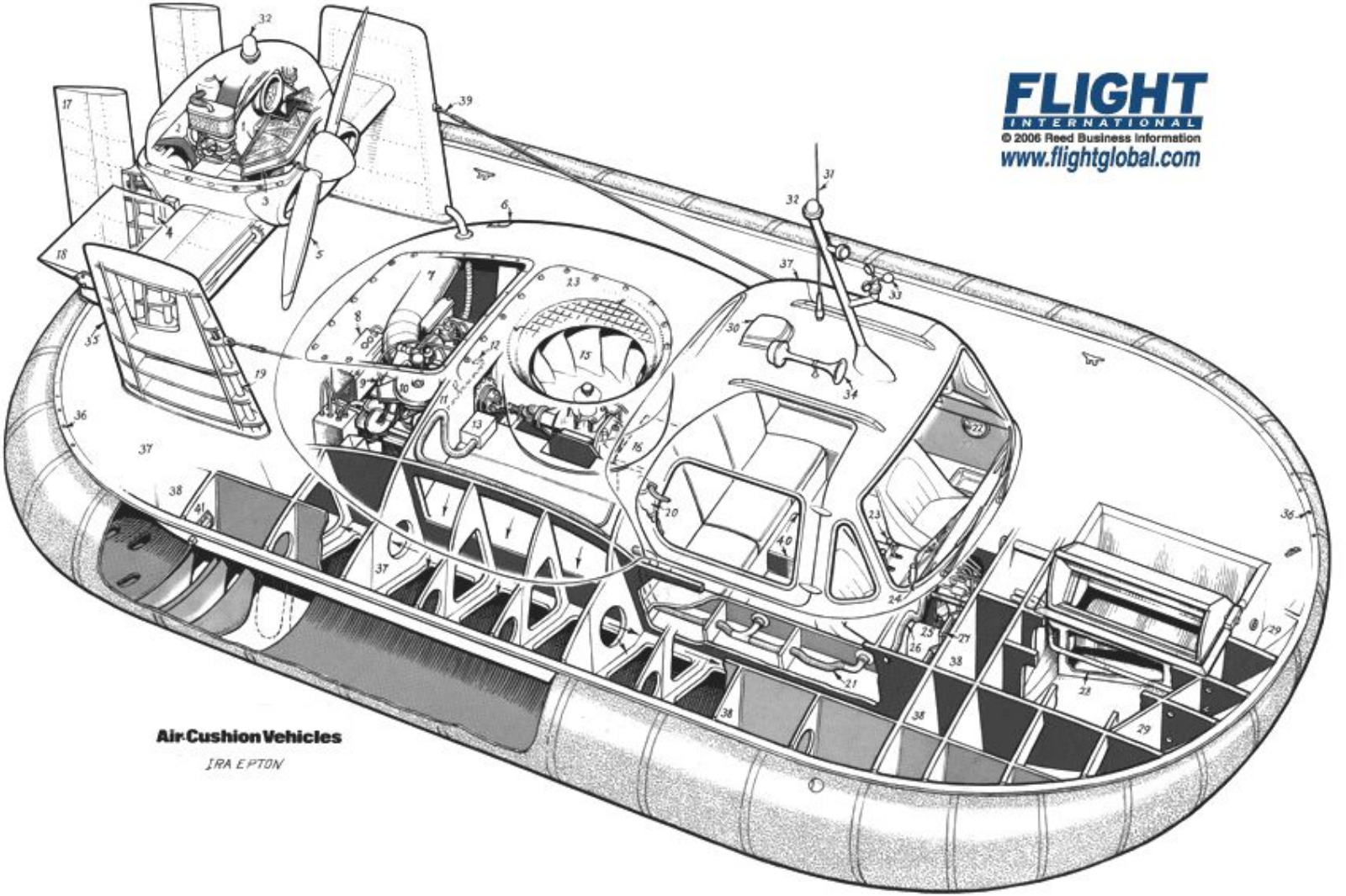

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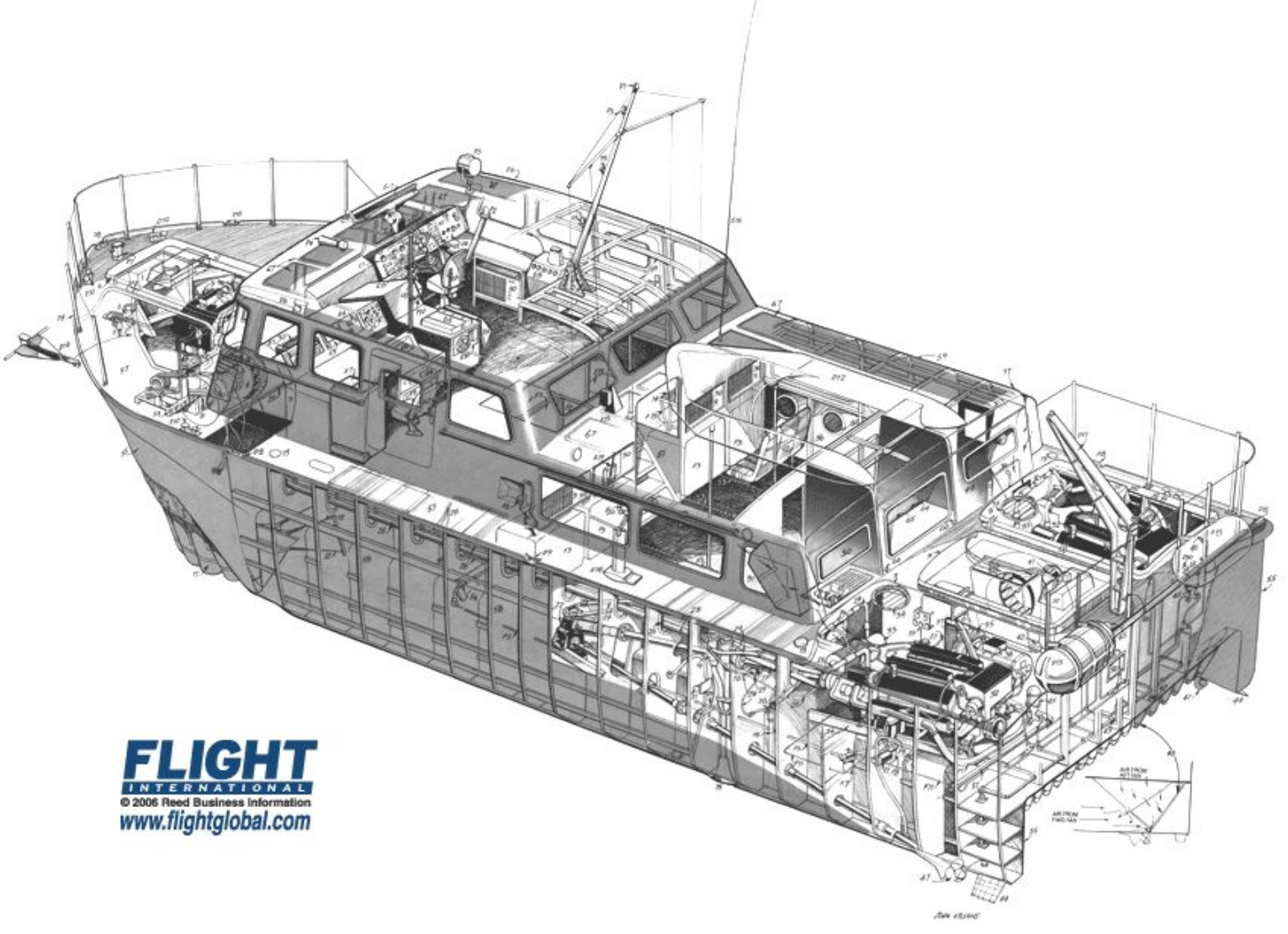
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Air Cushion Vehicles

IRA EPTON

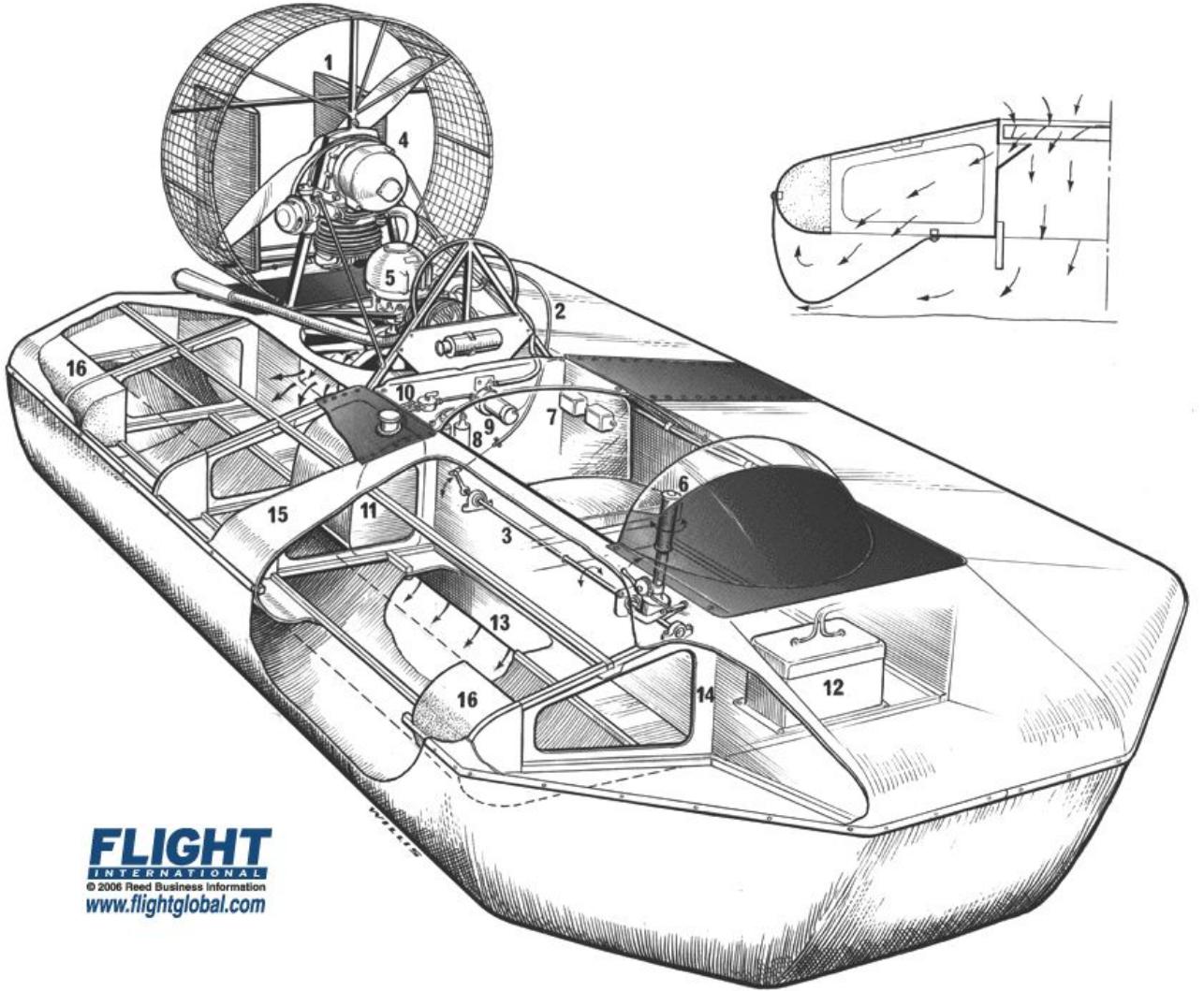
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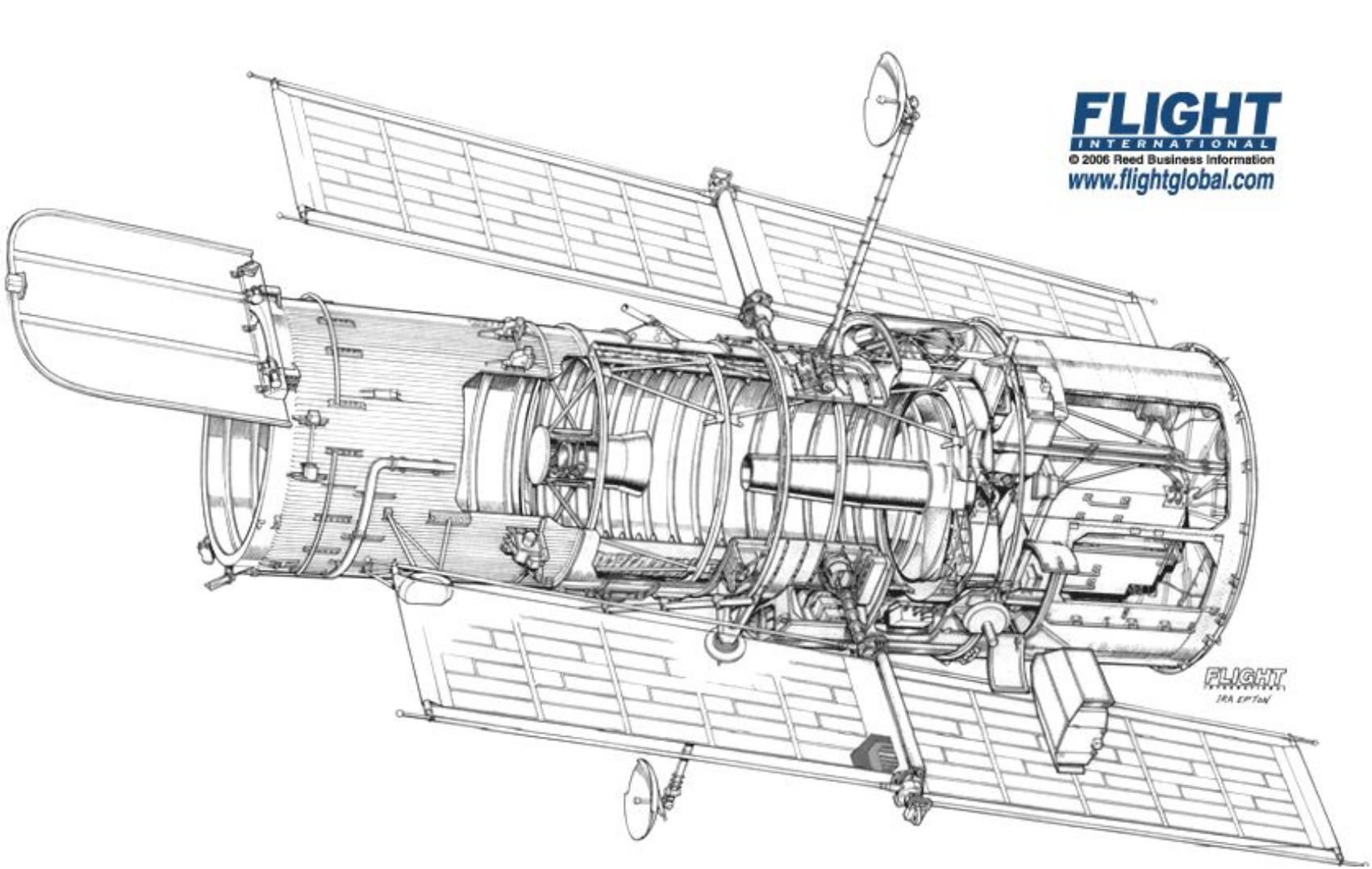
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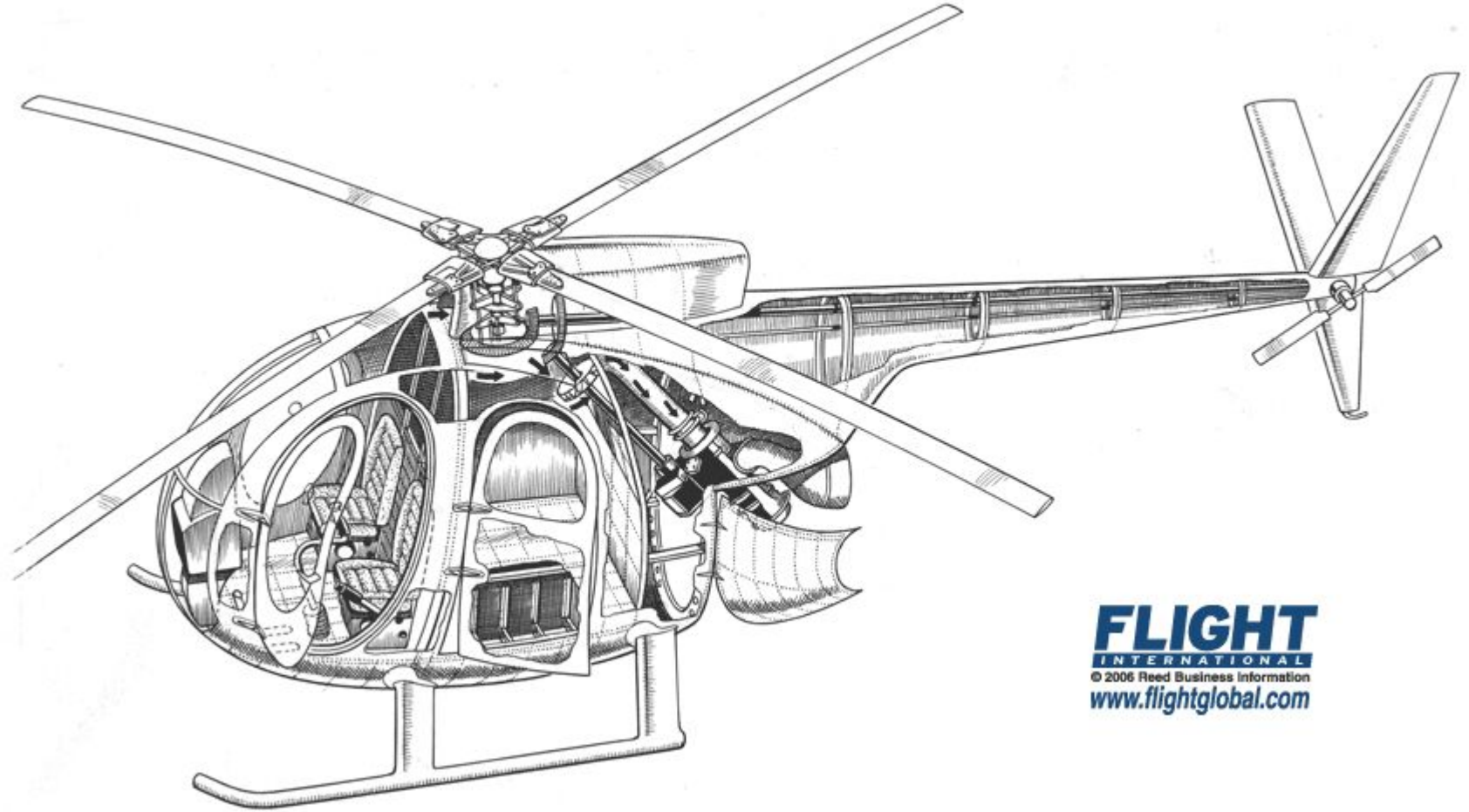
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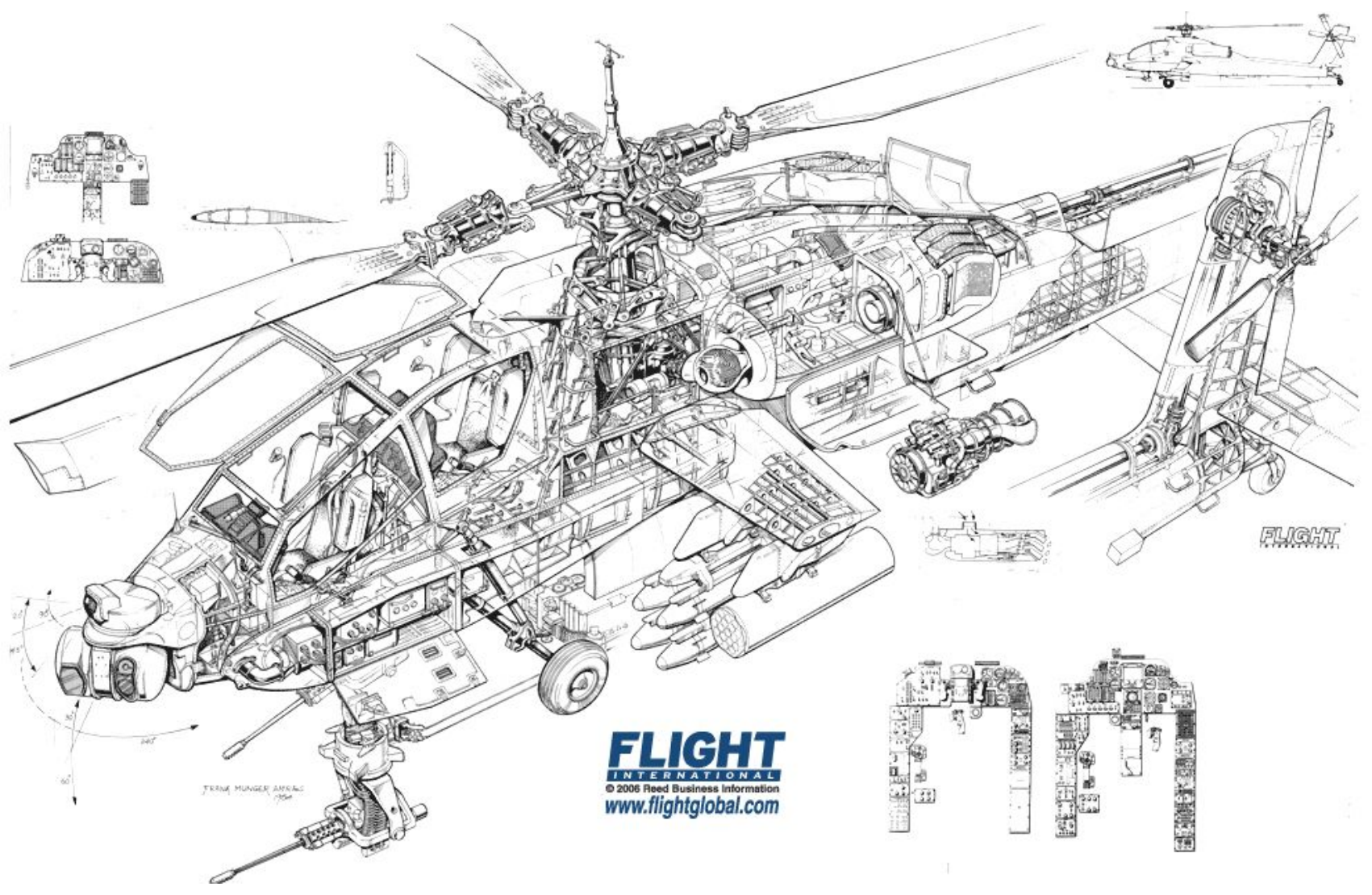


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IRA EPTON



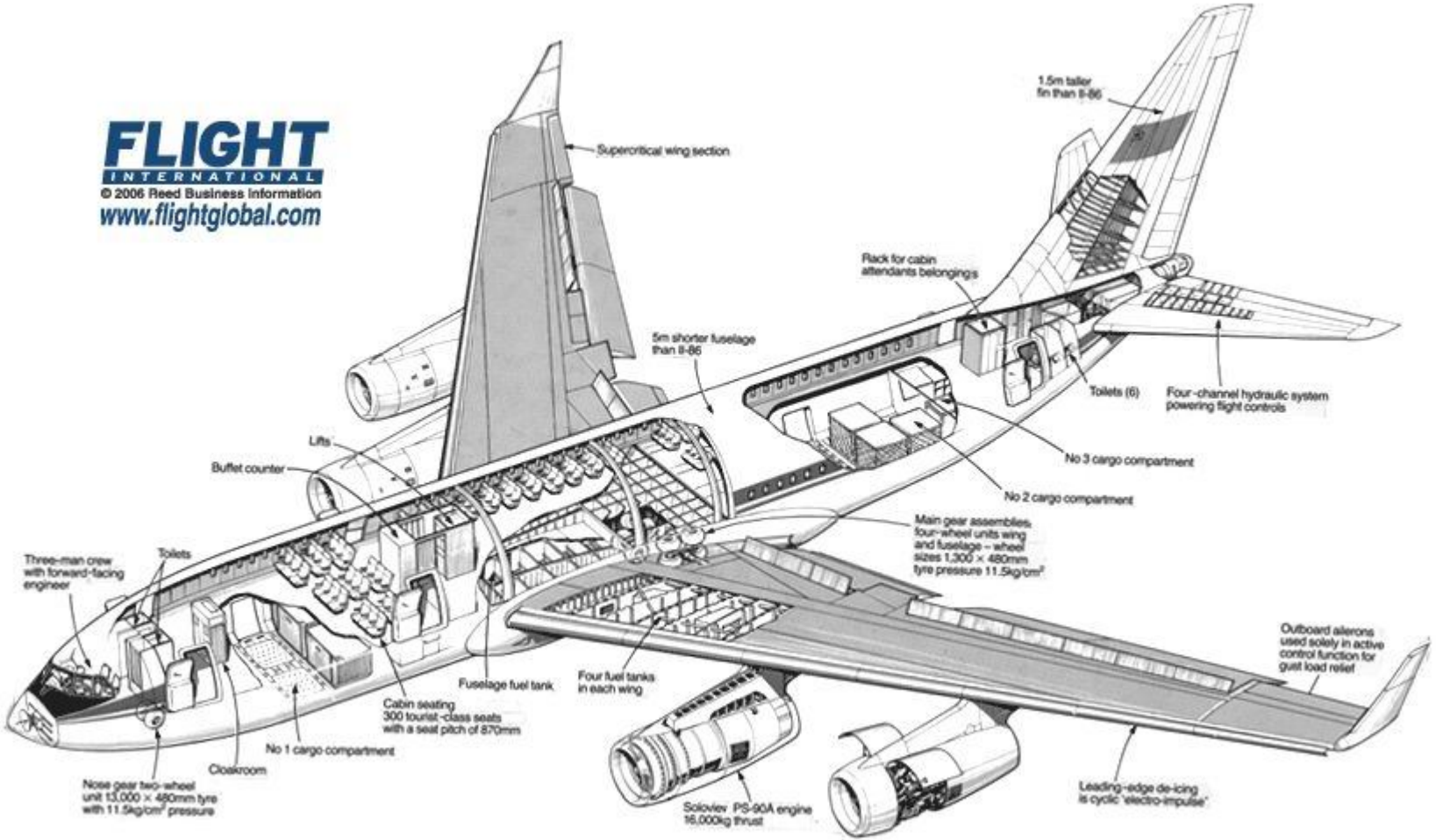
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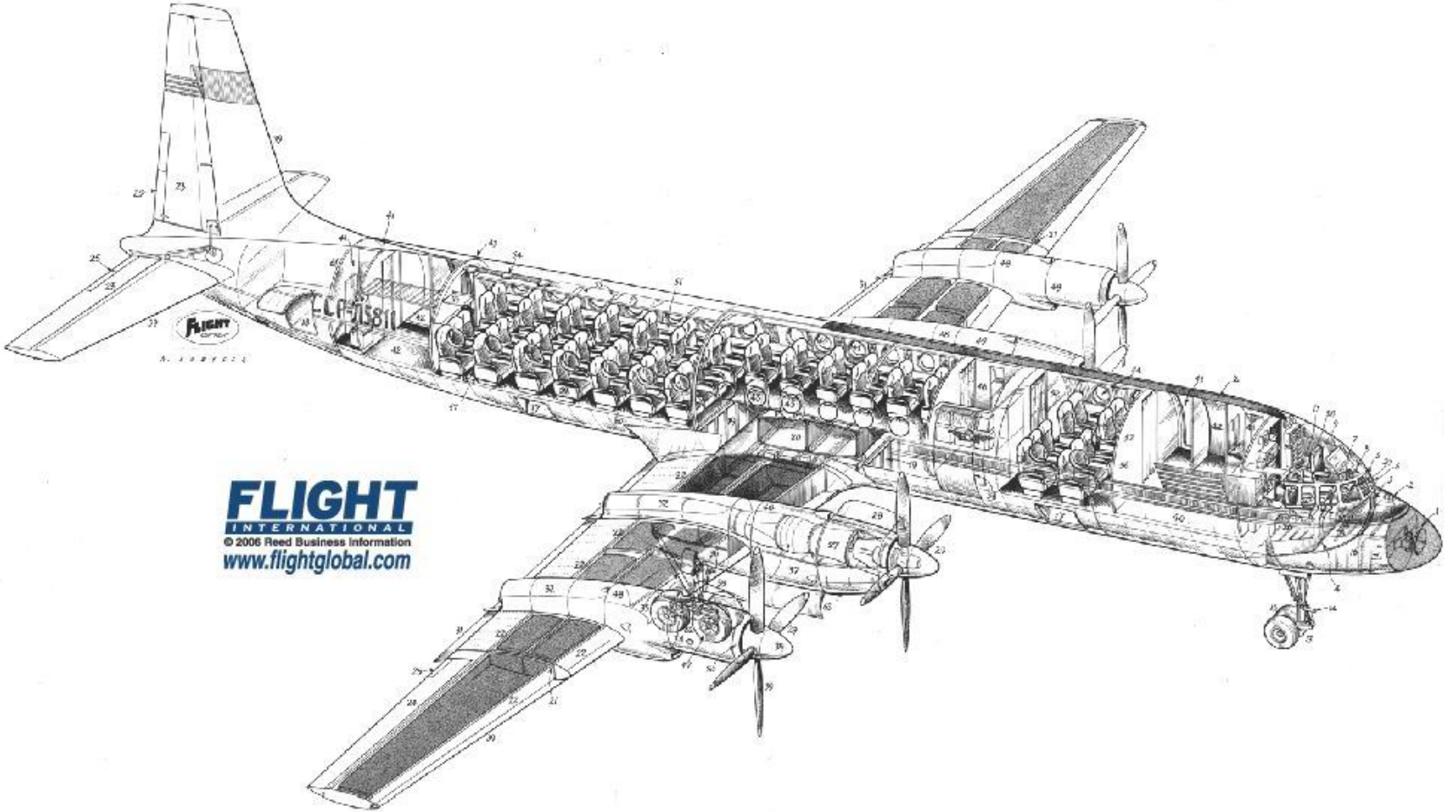


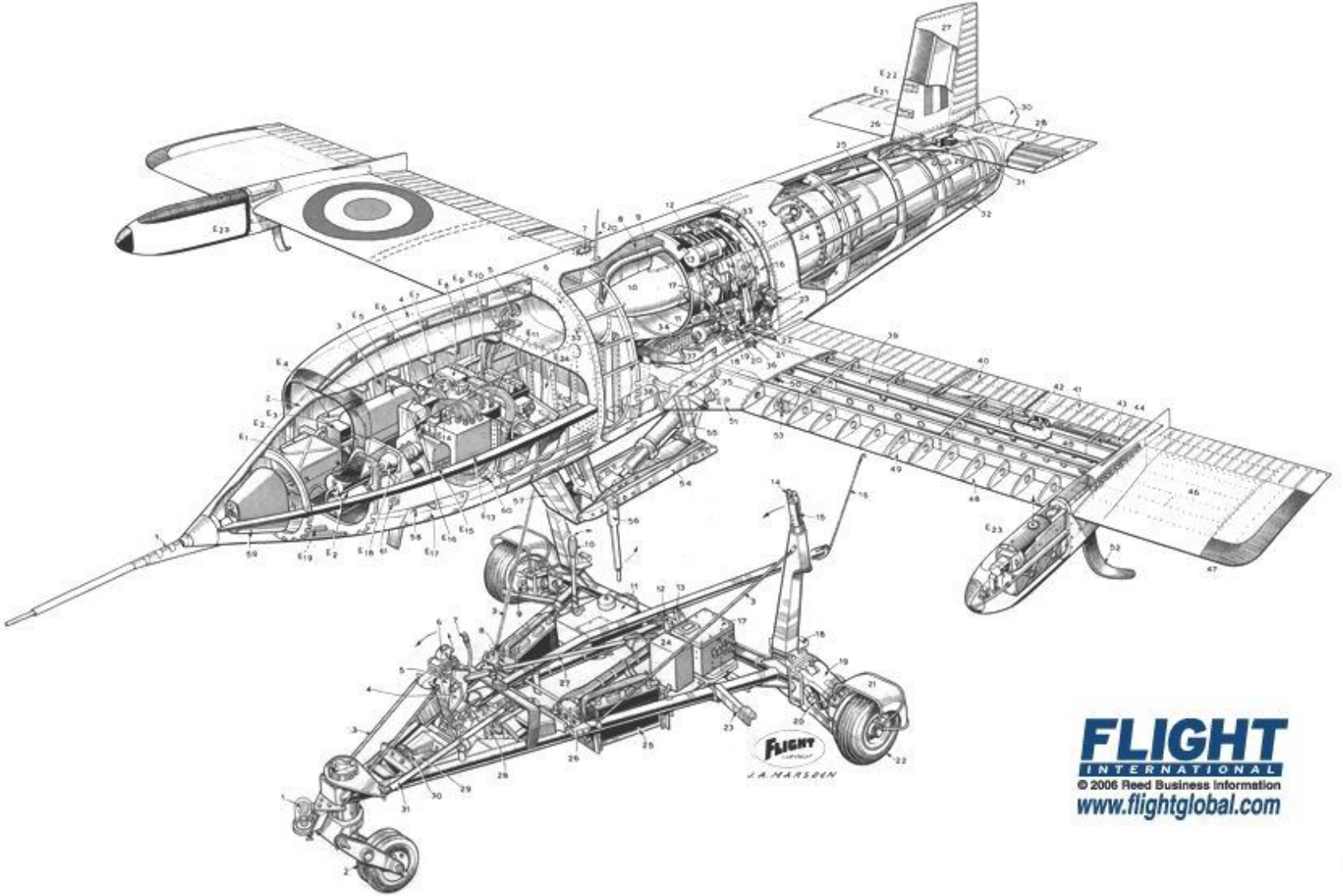
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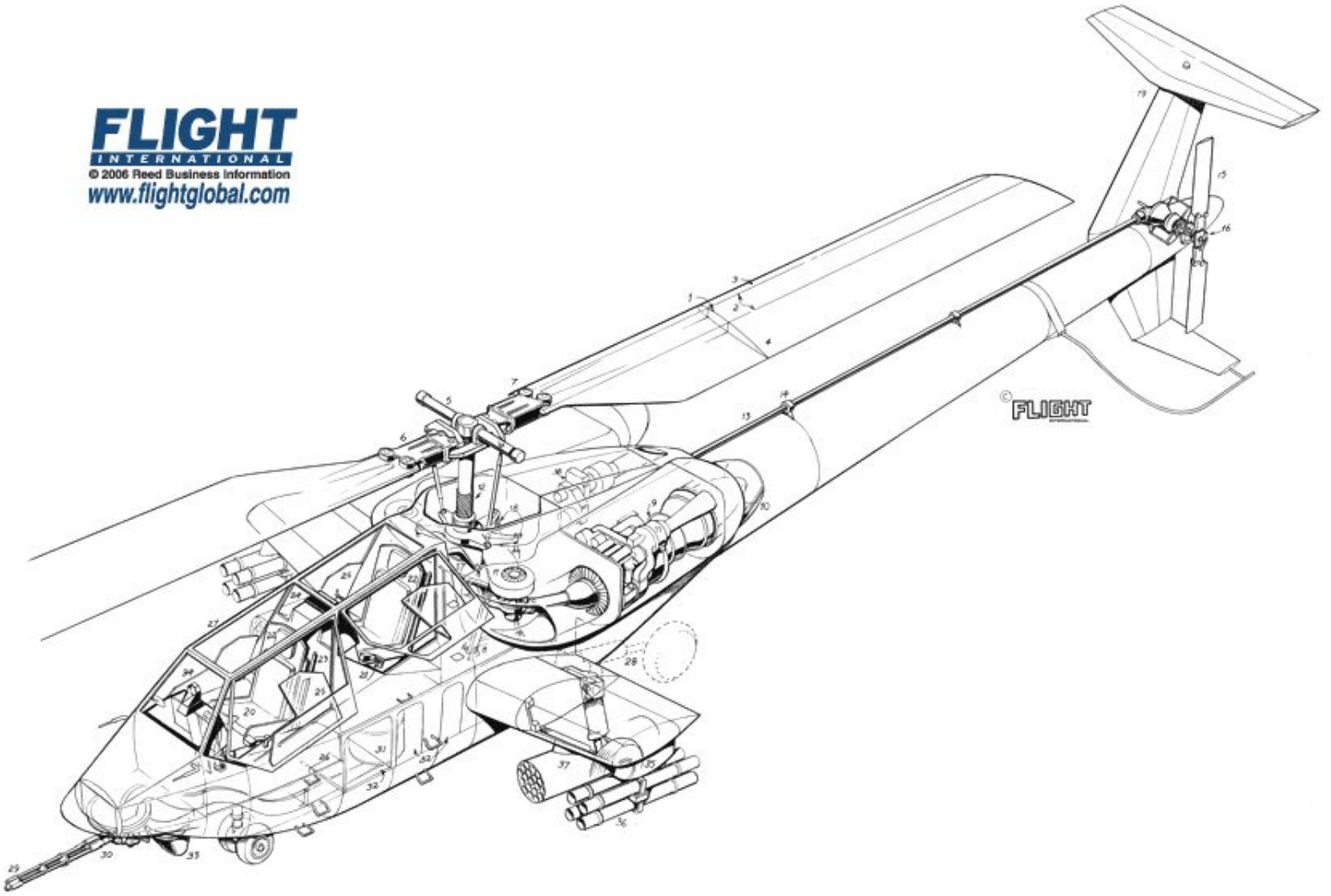

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1.5m taller fin than Il-86
Supercritical wing section
Rack for cabin attendants belongings
5m shorter fuselage than Il-86
Toilets (6)
Four-channel hydraulic system powering flight controls
Lifts
Buffet counter
No 3 cargo compartment
No 2 cargo compartment
Main gear assemblies four-wheel units wing and fuselage – wheel sizes 1,300 × 480mm tyre pressure 11.5kg/cm²
Three-man crew with forward-facing engineer
Toilets
Outboard ailerons used solely in active control function for gust load relief
Fuselage fuel tank
Four fuel tanks in each wing
Cabin seating 300 tourist-class seats with a seat pitch of 870mm
No 1 cargo compartment
Cloakroom
Nose gear two-wheel unit 13,000 × 480mm tyre with 11.5kg/cm² pressure
Soloviev PS-90A engine 16,000kg thrust
Leading-edge de-icing is cyclic 'electro-impulse'


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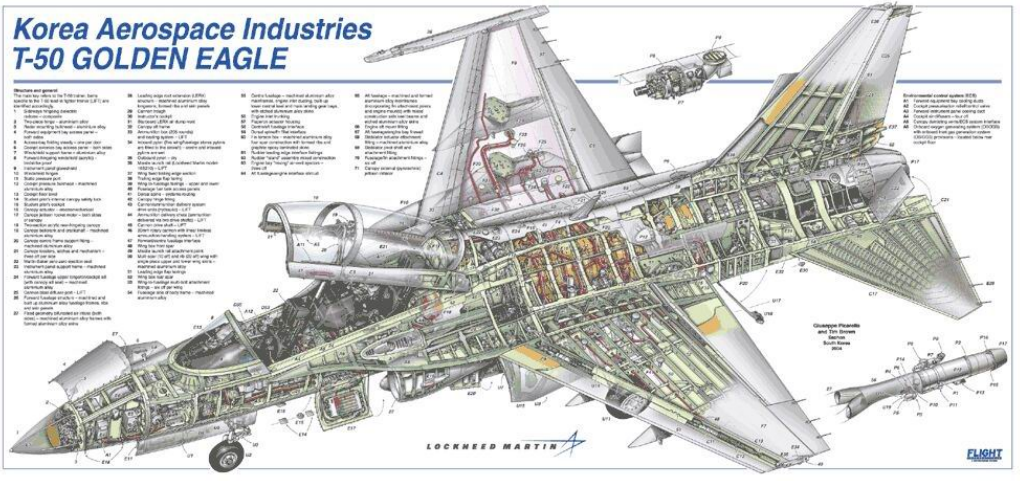


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Korea Aerospace Industries
T-50 GOLDEN EAGLE

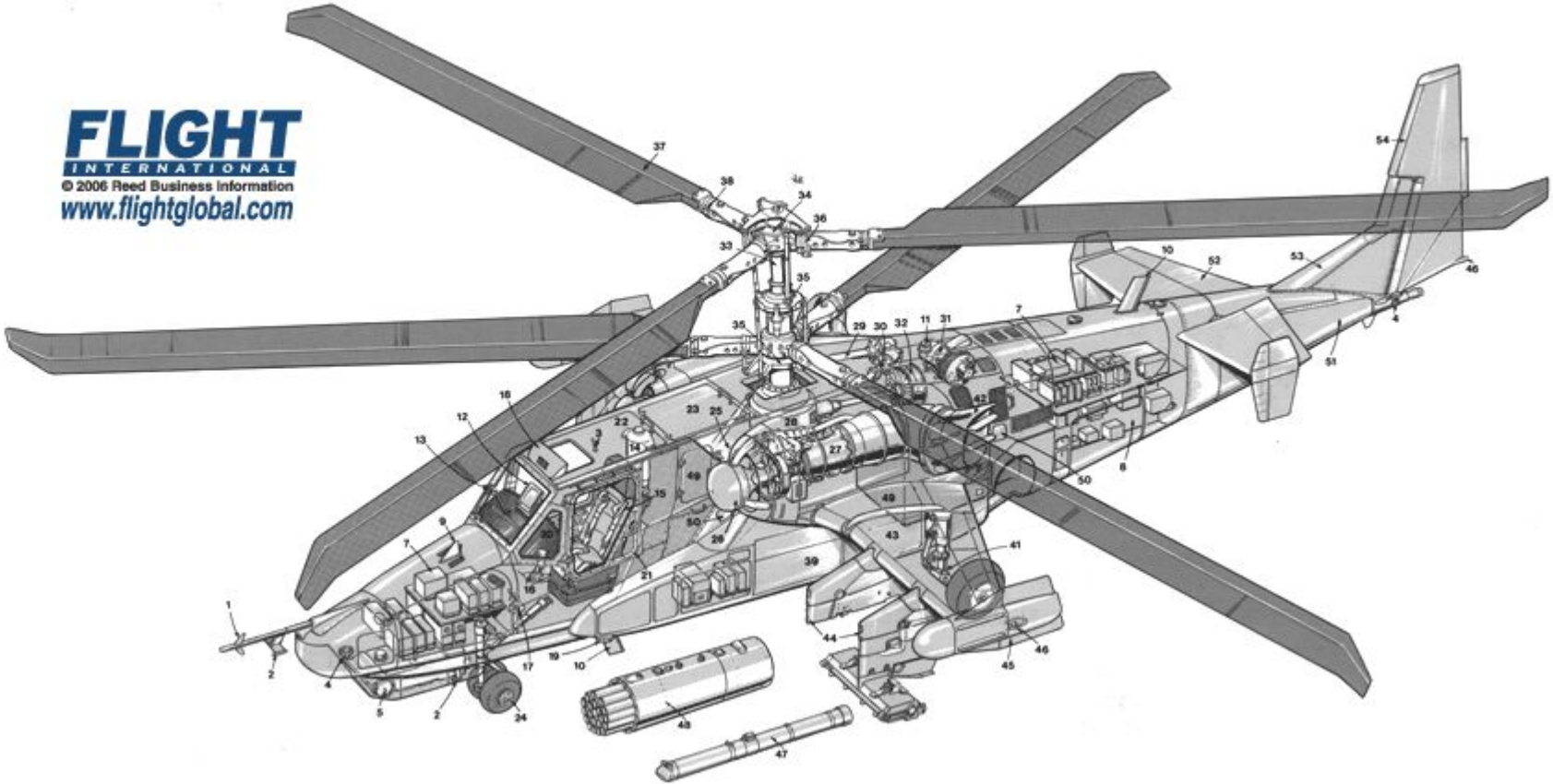


GOLDEN EAGLE



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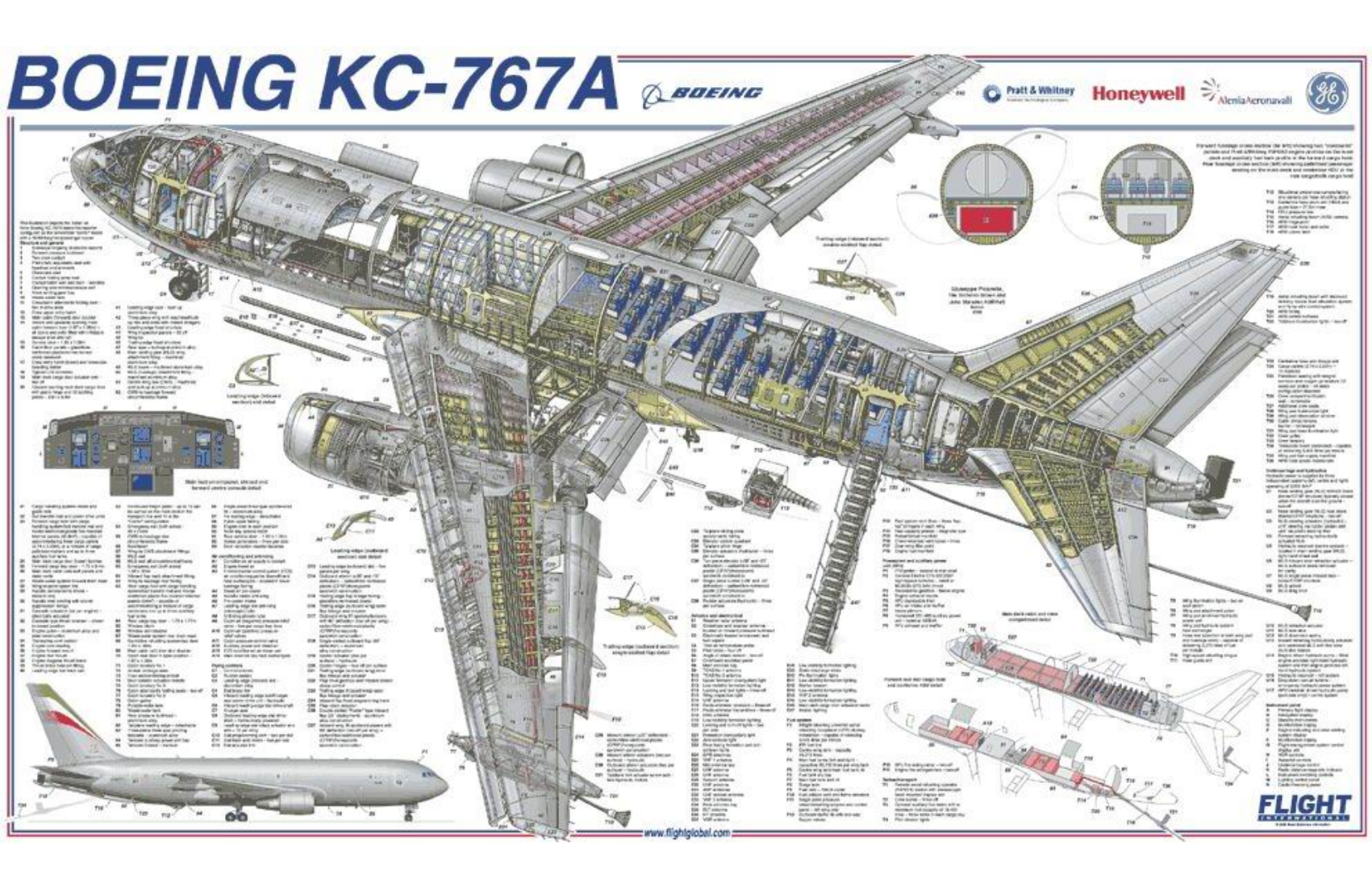


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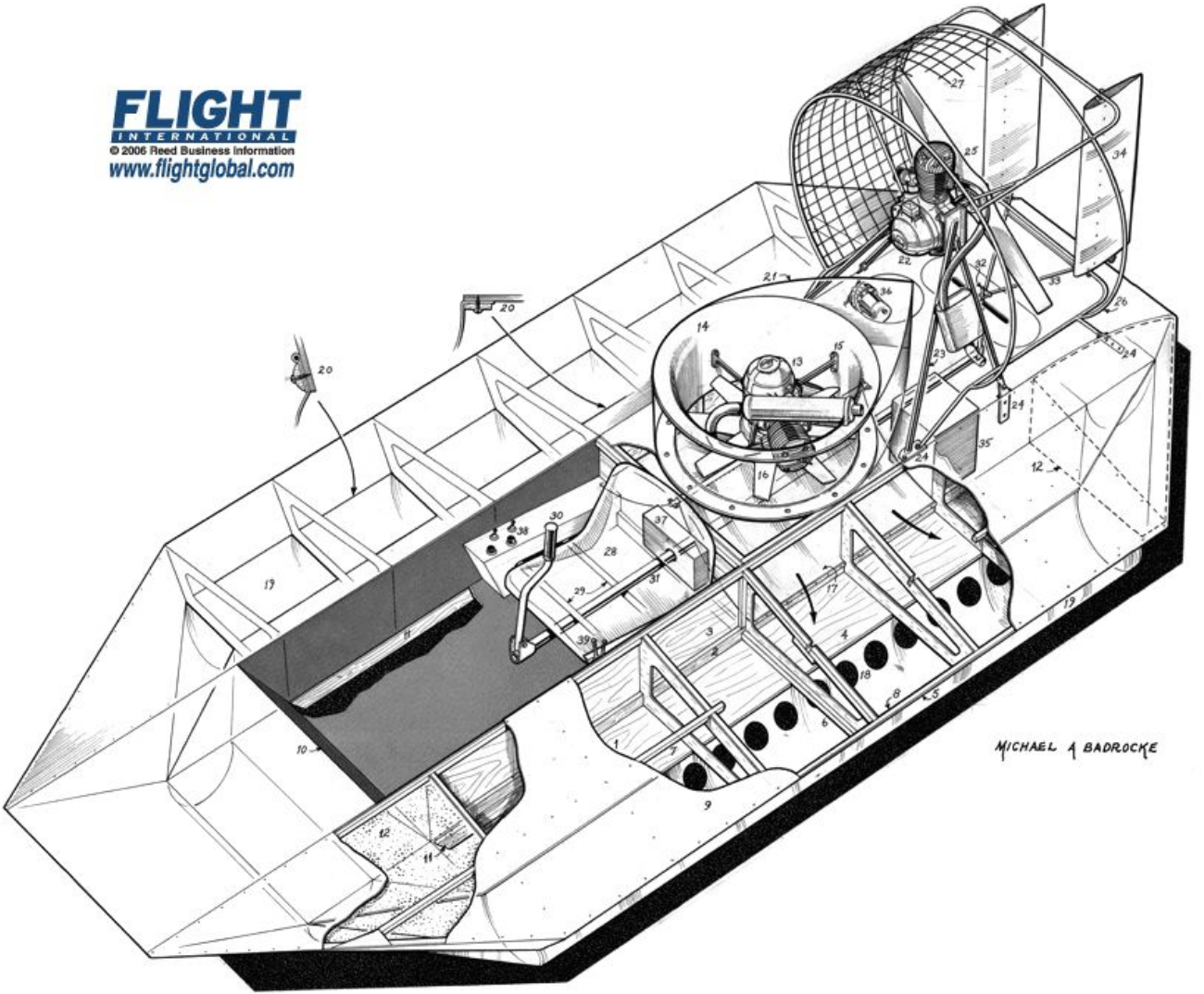
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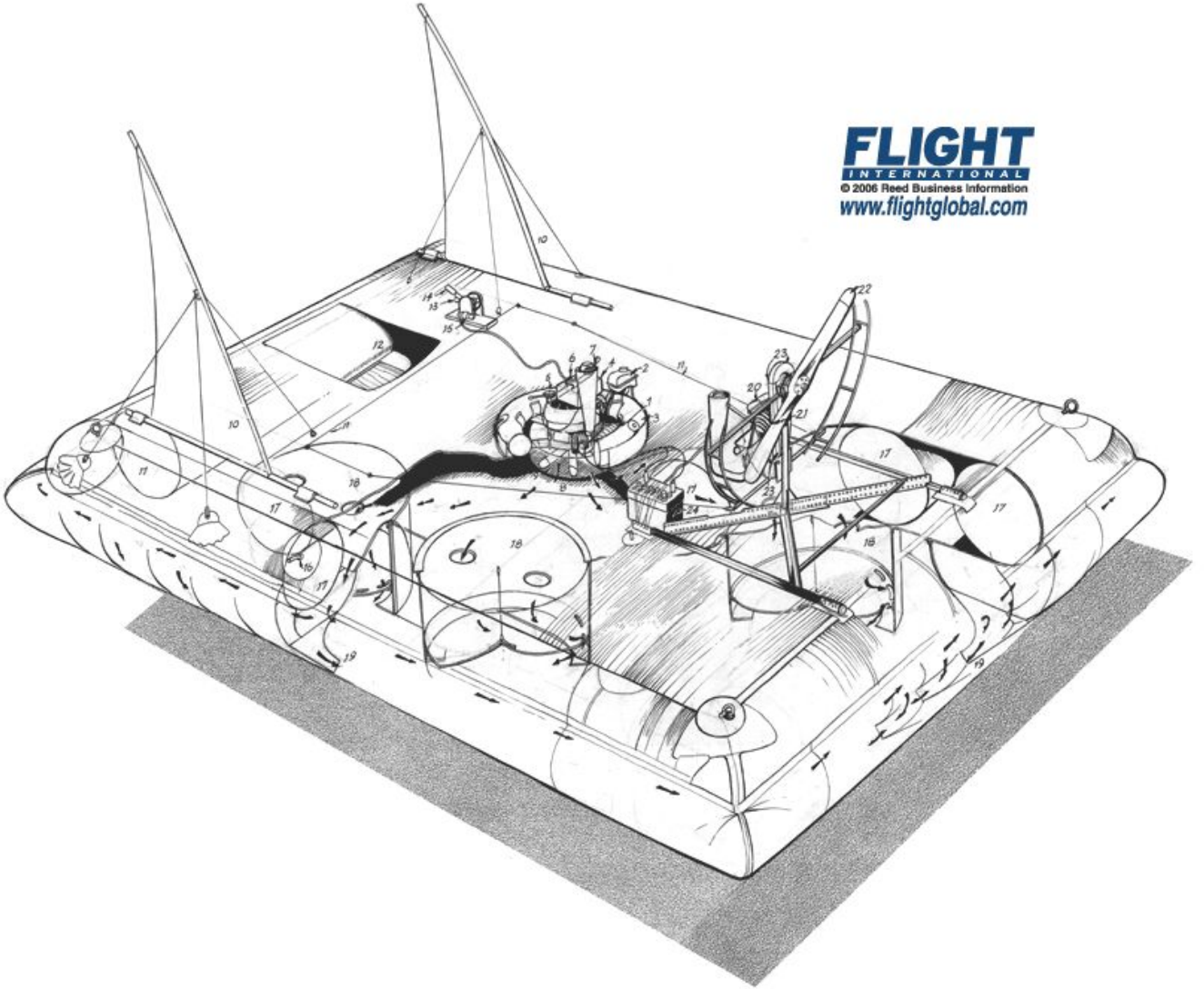
BOEING KC-767A



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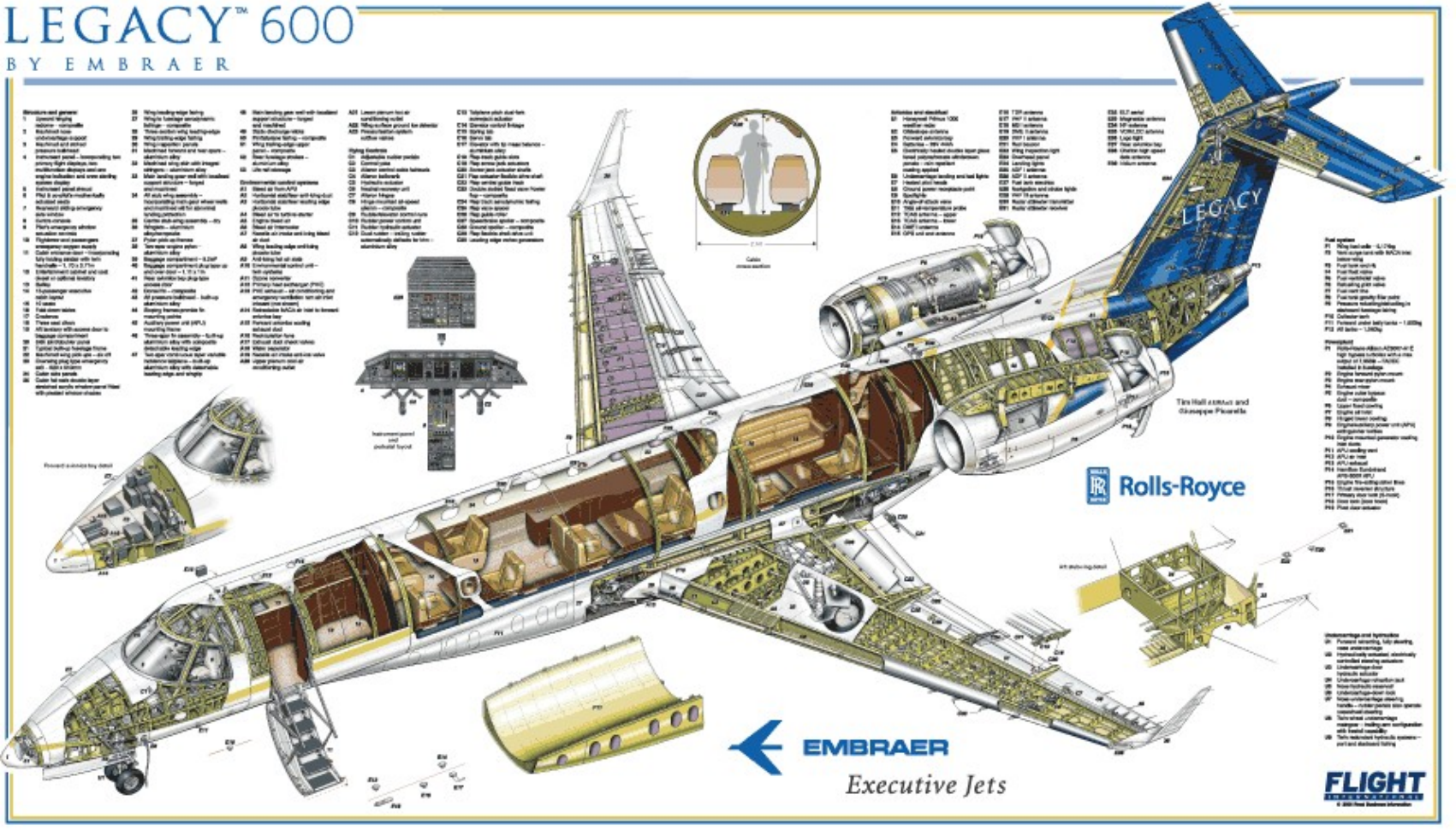


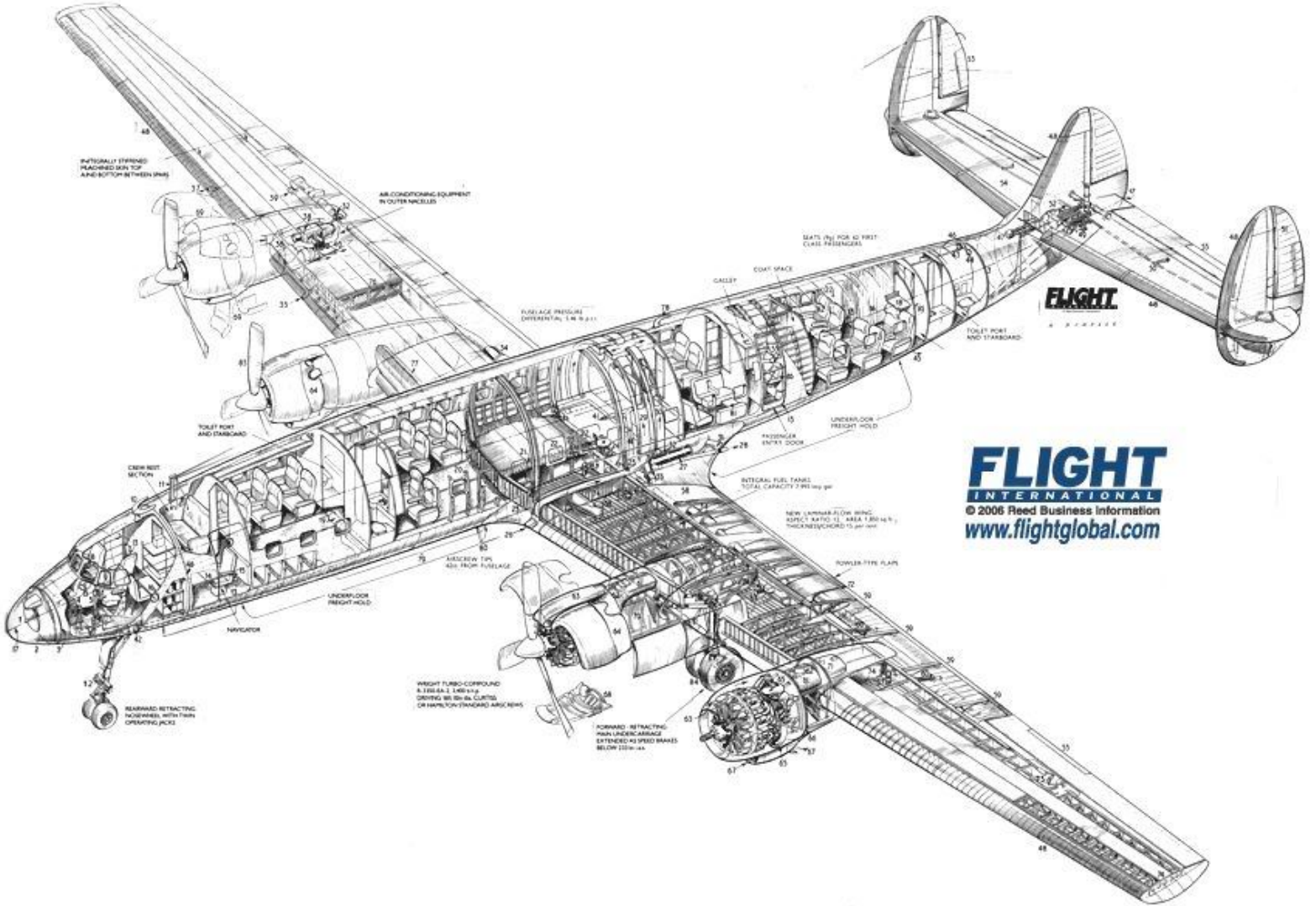


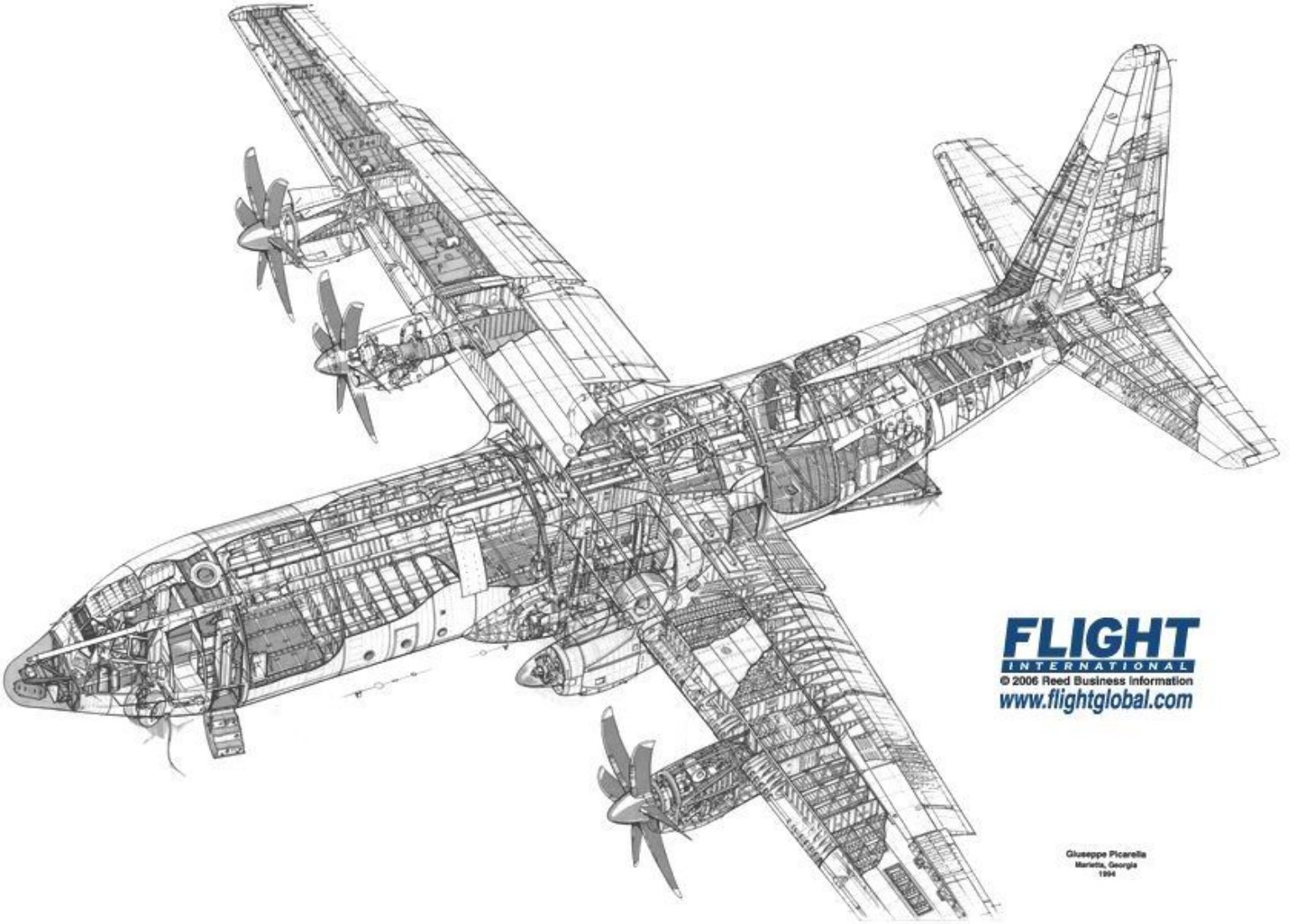
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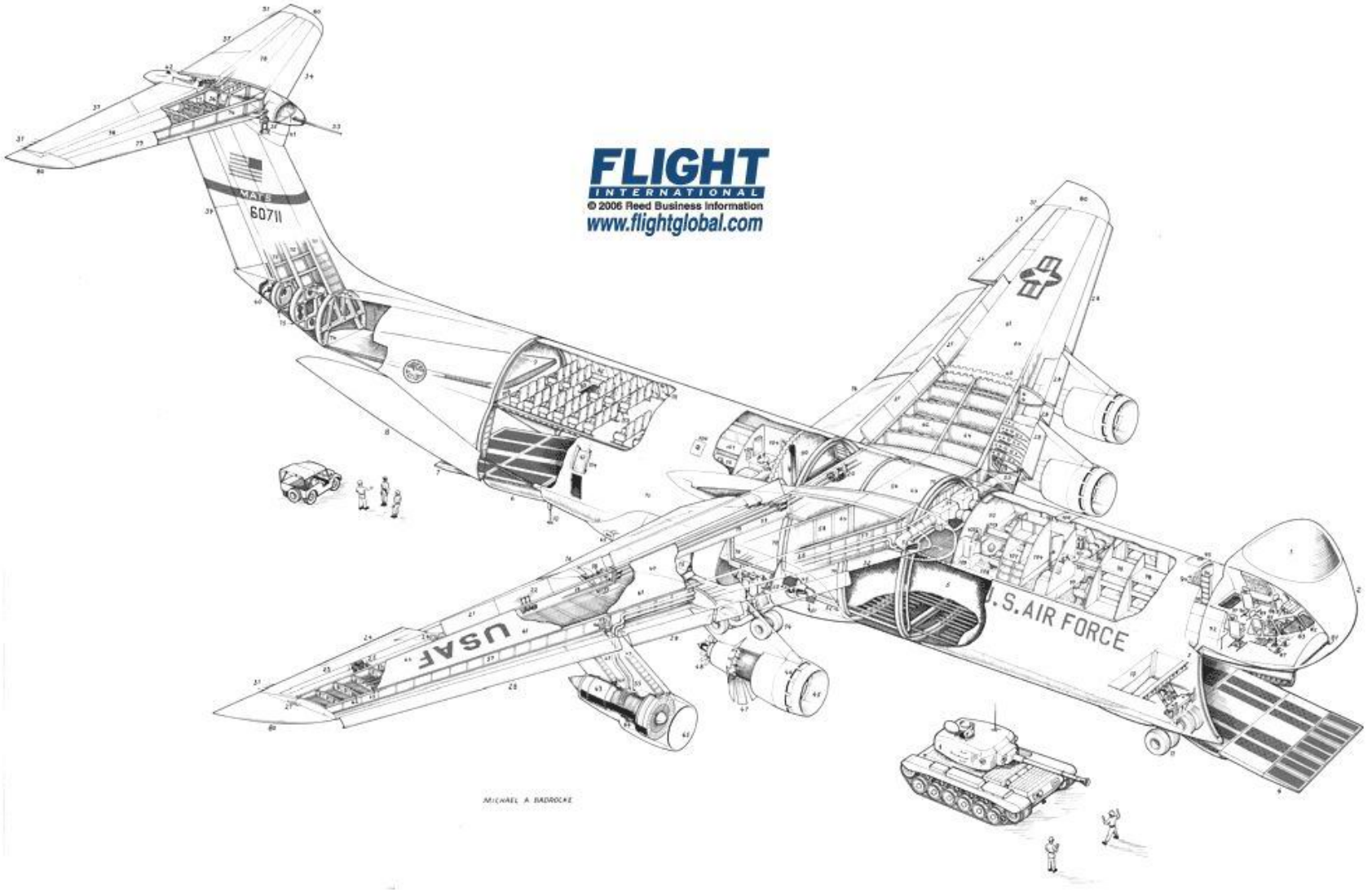
LEGACY™ 600

BY EMBRAER

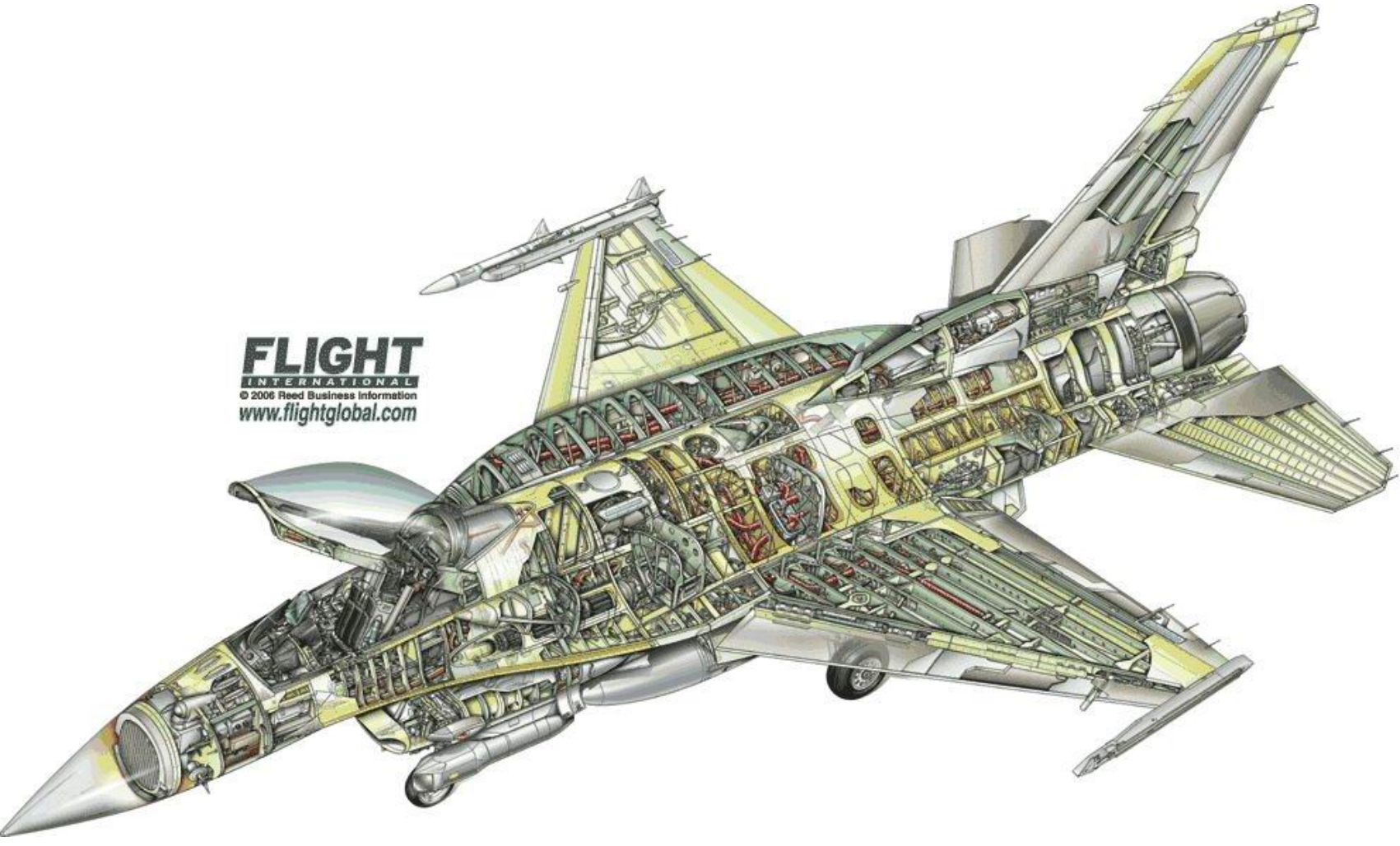


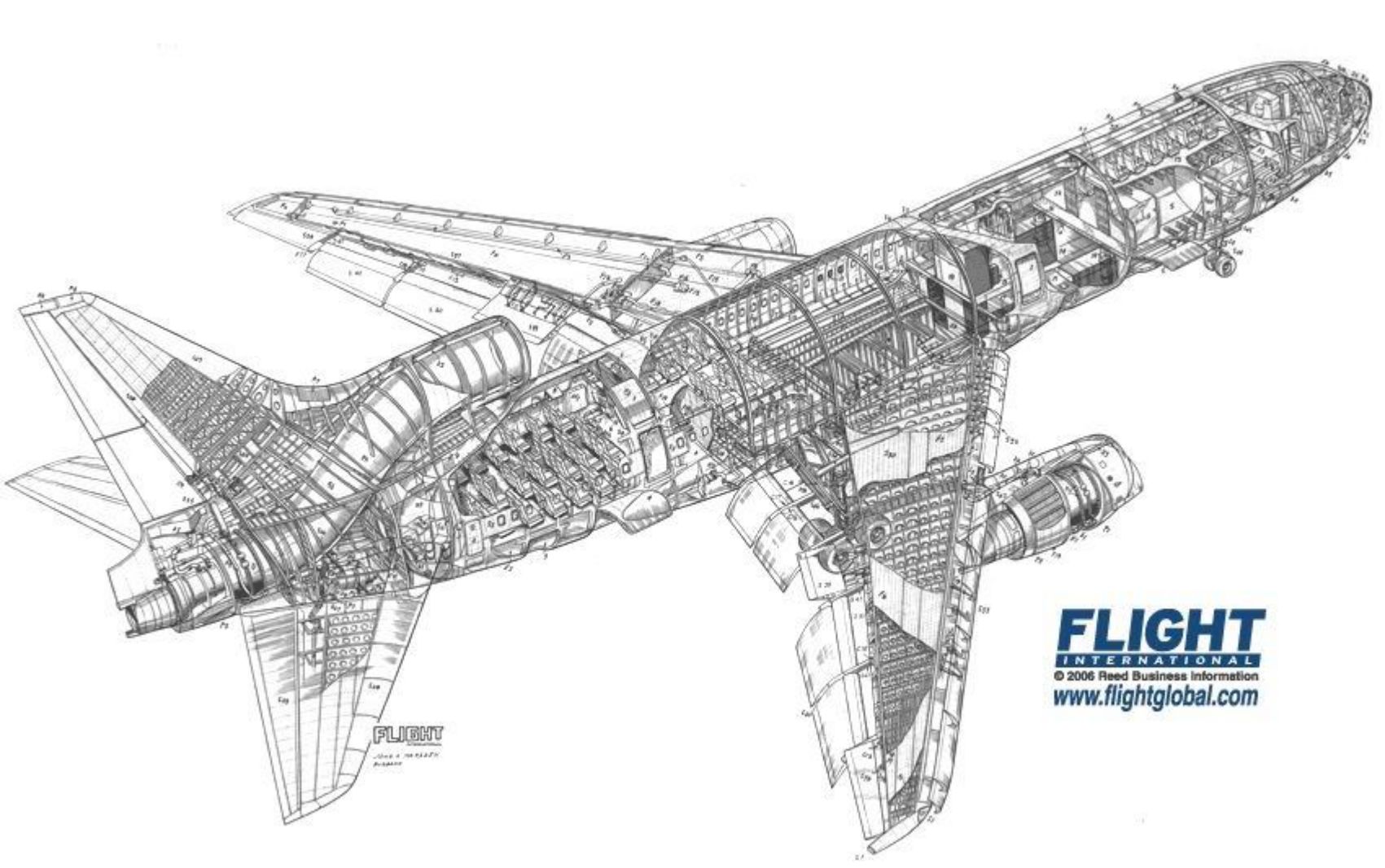

INTEGRALLY STIFFENED MACHINED SKIN TOP AND BOTTOM (BETWEEN SPARS)
AIR-CONDITIONING EQUIPMENT IN OUTER NACELLES
SEATS (by) FOR 62 FIRST CLASS PASSENGERS
COAT SPACE
GALLEY
FUSELAGE PRESSURE DIFFERENTIAL 3.46 lb./sq.in.
TOILET PORT AND STARBOARD
UNDERFLOOR FREIGHT HOLD
PASSENGER ENTRY DOOR
TOILET PORT AND STARBOARD
CREW REST SECTION
INTEGRAL FUEL TANKS TOTAL CAPACITY 7 993 Imp gal
NEW LAMINAR-FLOW WING ASPECT RATIO 11 AREA 1,800 sq ft THICKNESS/CHORD 15 per cent
PROPELLER TIPS 42in. FROM FUSELAGE
POWER-TYPE FLAPS
UNDERFLOOR FREIGHT HOLD
NAVIGATOR
WRIGHT TURBO-COMPOUND R-3350-6A-2 3,400 b.h.p. DRIVING 180 12in dia CURTISS OR HAMILTON-STANDARD AIRSCREWS
REARWARD-RETRACTING NOSEWHEEL WITH TWIN OPERATING JACKS
FORWARD-RETRACTING MAIN UNDERCARRIAGE EXTENDED AS SPEED BRAKES BELOW 220 m.p.h.
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A DIAPLEX
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Giuseppe Picarella
Marietta, Georgia
1994

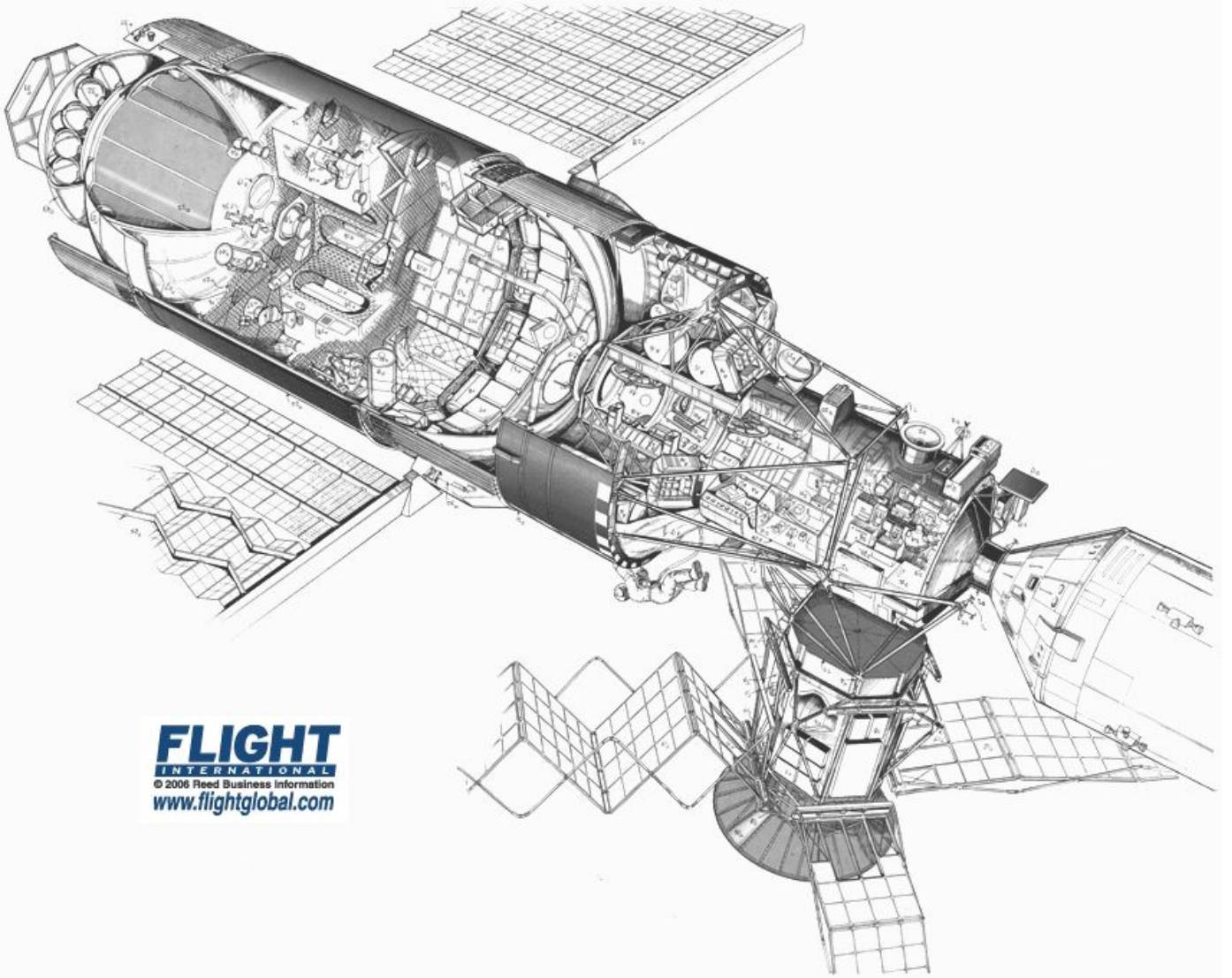


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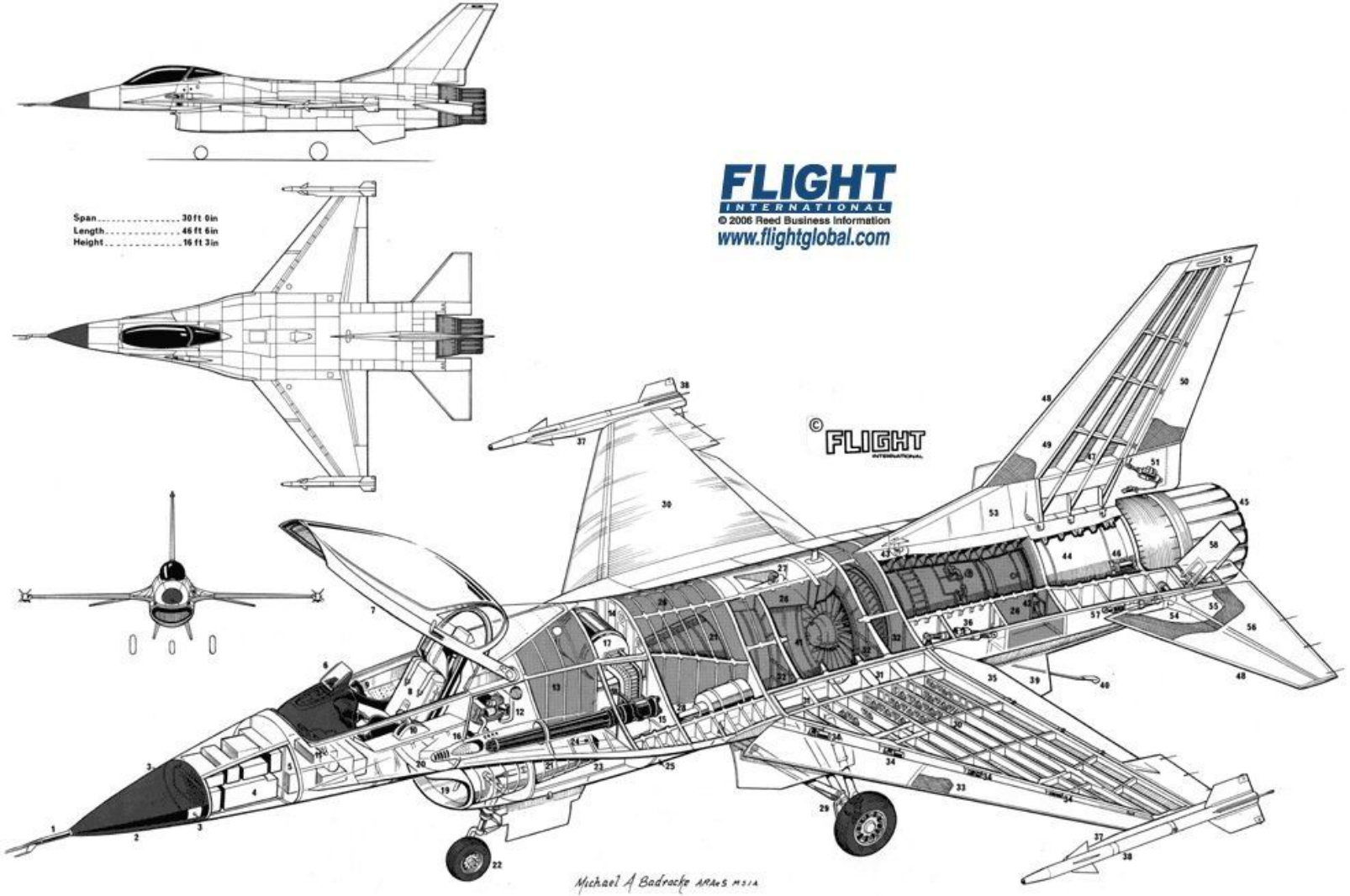

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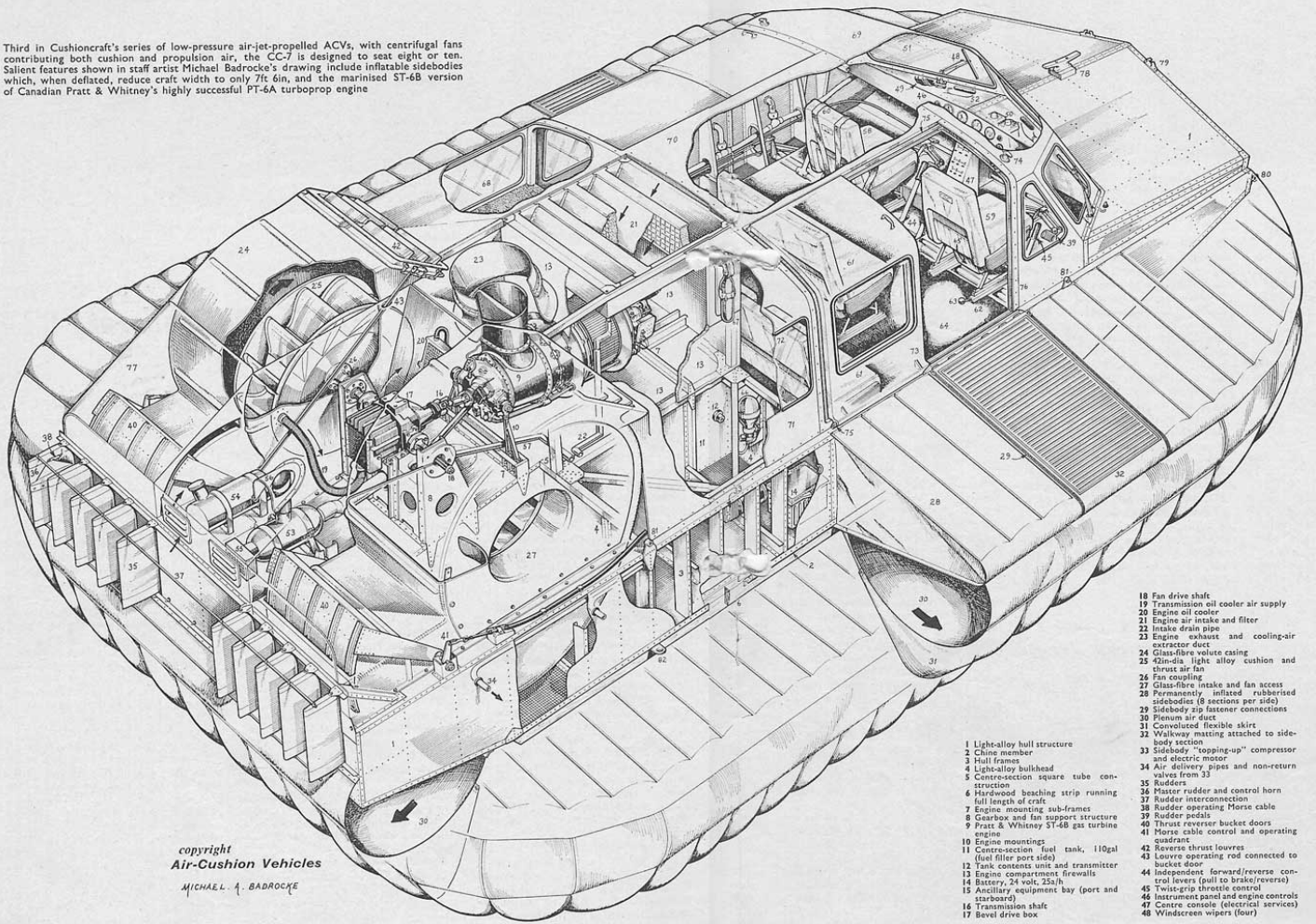

Span ..... 30 ft 0in
Length ..... 46 ft 6in
Height ..... 16 ft 3in
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Michael A Badrocke ARAeS MSIA

FLIGHT International supplement, 23 May 1968

CUSHIONCRAFT CC-7 . . .

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Third in Cushioncraft's series of low-pressure air-jet-propelled ACVs, with centrifugal fans contributing both cushion and propulsion air, the CC-7 is designed to seat eight or ten. Salient features shown in staff artist Michael Badrocke's drawing include inflatable sidebodies which, when deflated, reduce craft width to only 7ft 6in, and the marinised ST-6B version of Canadian Pratt & Whitney's highly successful PT-6A turboprop engine

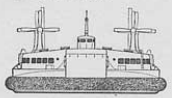


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Air-Cushion Vehicles
MICHAEL A. BADROCKE

1 Light-alloy hull structure
2 Chine member
3 Hull frames
4 Light-alloy bulkhead
5 Centre-section square tube construction
6 Hardwood beaching strip running full length of craft
7 Engine mounting sub-frames
8 Gearbox and fan support structure
9 Pratt & Whitney ST-6B gas turbine engine
10 Engine mountings
11 Centre-section fuel tank, 110gal (fuel filler port side)
12 Tank contents unit and transmitter
13 Engine compartment firewalls
14 Battery, 24 volt, 25a/h
15 Ancillary equipment bay (port and starboard)
16 Transmission shaft
17 Bevel drive box
18 Fan drive shaft
19 Transmission oil cooler air supply
20 Engine oil cooler
21 Engine air intake and filter
22 Intake drain pipe
23 Engine exhausts and cooling-air extractor duct
24 Glass-fibre volute casing
25 42in-dia light alloy cushion and thrust air fan
26 Fan coupling
27 Glass-fibre intake and fan access
28 Permanently inflated rubberised sidebodies (8 sections per side)
29 Sidebody zip fastener connections
30 Plenum air duct
31 Convoluted flexible skirt
32 Walkway matting attached to sidebody section
33 Sidebody "topping-up" compressor and electric motor
34 Air delivery pipes and non-return valves from 33
35 Rudders
36 Master rudder and control horn
37 Rudder interconnection
38 Rudder operating Morse cable
39 Rudder pedals
40 Thrust reverser bucket doors
41 Morse cable control and operating quadrant
42 Reverse thrust louvres
43 Louvre operating rod connected to bucket door
44 Independent forward/reverse control levers (pull to brake/reverse)
45 Twist-grip throttle control
46 Instrument panel and engine controls
47 Centre console (electrical services)
48 Windscreen wipers (four)
49 Windscreen wiper electric motors (four)
50 Electrically operated windscreen washer
51 Triplex windscreens
52 De-mister air ducts
53 Oil burning heater unit (cabin air and de-mist air)
54 Heater fuel tank
55 Air intake and filter
56 Heater exhaust
57 Hot-air delivery pipe
58 Driver's seat
59 Second crew member's seat
60 Seat harness
61 Passenger seats
62 Seat rails
63 Seat travel lock release
64 Alloy and wood sandwich floor panels
65 Life jacket stowage beneath seat
66 Fixed fire extinguisher
67 Demountable fire extinguisher
68 Baggage compartment (port and starboard)
69 Glass-fibre cab structure
70 Glass-fibre centre cabin section (not fitted for freight carrying)
71 Glass-fibre rear cabin section
72 Acrylic sheet side windows
73 Sliding door
74 Door latch
75 Door rails
76 Door shroud and drain
77 Glass-fibre rear fairings
78 Cleat
79 Open fairlead
80 Towing and mooring point
81 Slinging and jacking point
82 Jack steady

FLIGHT International supplement, 21 September 1967

Air-Cushion Vehicles



SR.N4—The Biggest Yet . . .

BRITISH HOVERCRAFT CORPORATION SR.N4

Drive-on, drive-off car loading, and simultaneous embarkation and disembarkation of passengers through entrances on both sides are quick-turnround features of the SR.N4, shown by staff artist Frank Munger. Inset diagrams show hydraulic systems

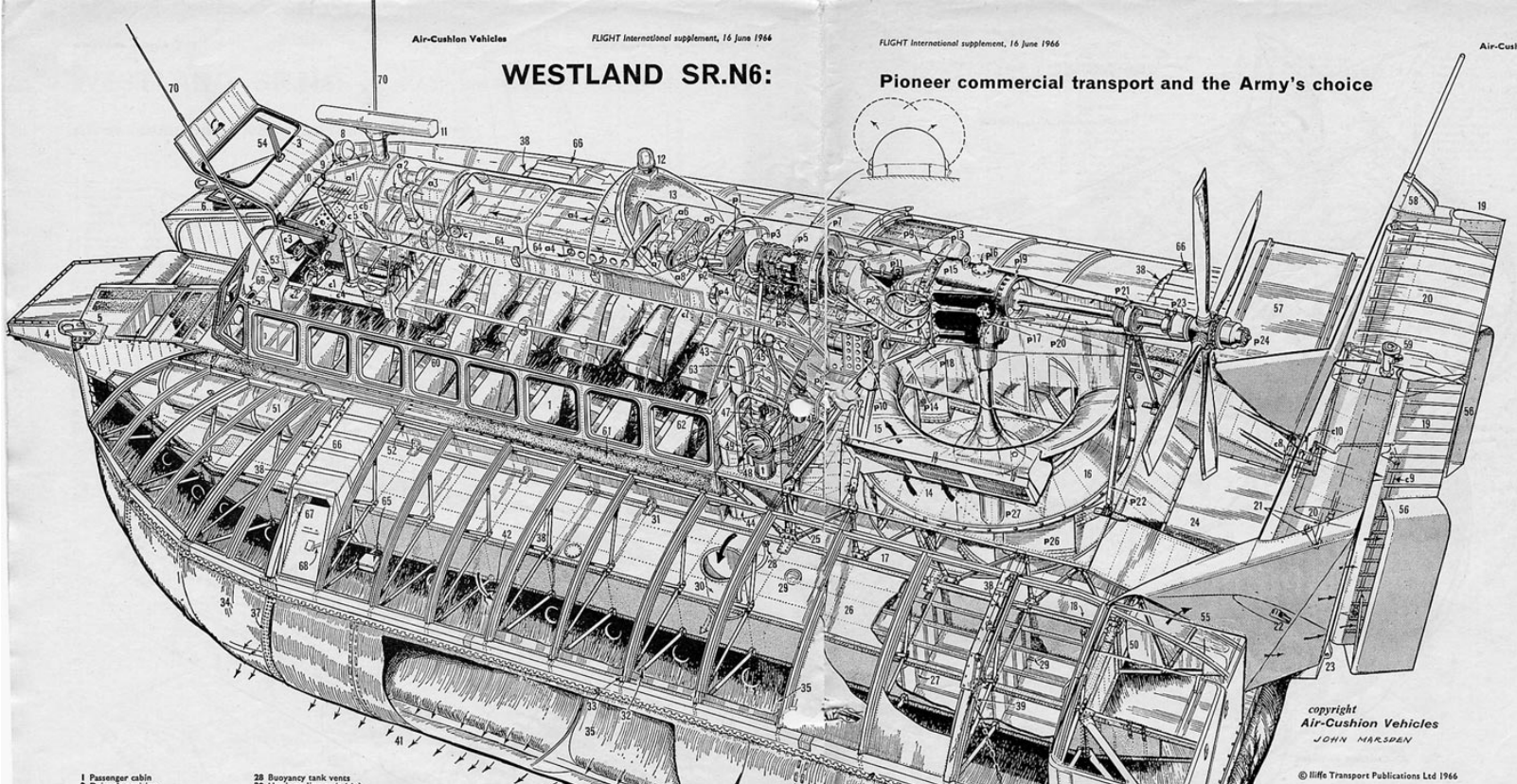
1 T-section boom and web roof frames
2 Extruded external stringers 1.5in deep
3 Glass-fibre intake ducts
4 Gearbox support extension
5 Glass-fibre control cabin structure
6 Glass-fibre pylon root fairing
7 Glass-fibre fin root fairing
8 Fin support post
9 Fin pintle
10 Fin bearings
11 Pylon bearing
12 Passenger deck support tubes 16g 1.5in dia
13 Passenger floor support beams
14 Honeycomb passenger floor panels
15 Seat attachments
16 Bow structure Z-section stringers
17 Bow support tubes
18 Bow structure vertical diaphragm
19 Buoyancy tank/car deck
20 Coach deck 16ft wide ¼in .003in honeycomb 1.5in thick, 20g top skin, 22g bottom skin
21 Car deck ¼in .002in honeycomb 1.5in thick, 20g top skin, 22g bottom skin
22 Outer bouyancy tank decking ¼in .003in honeycomb 1.5in thick, 26g top and bottom skin
23 T-section extrusion 20g web
24 Access panels
25 Bilge drain lines
26 Bilge pump housing
27 Loading ramp 18ft wide
28 Ramp extension
29 Ramp extension jack
30 Ramp restraining cable
31 Rear doors, total aperture 32ft × 12ft 6in max
32 Door jack
33 Door locks
34 Glass-fibre stair casing
35 Neoprene-coated nylon fabric skirt

Key continued on page 38

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WESTLAND SR.N6:

Pioneer commercial transport and the Army's choice



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Air-Cushion Vehicles
JOHN MARSDEN

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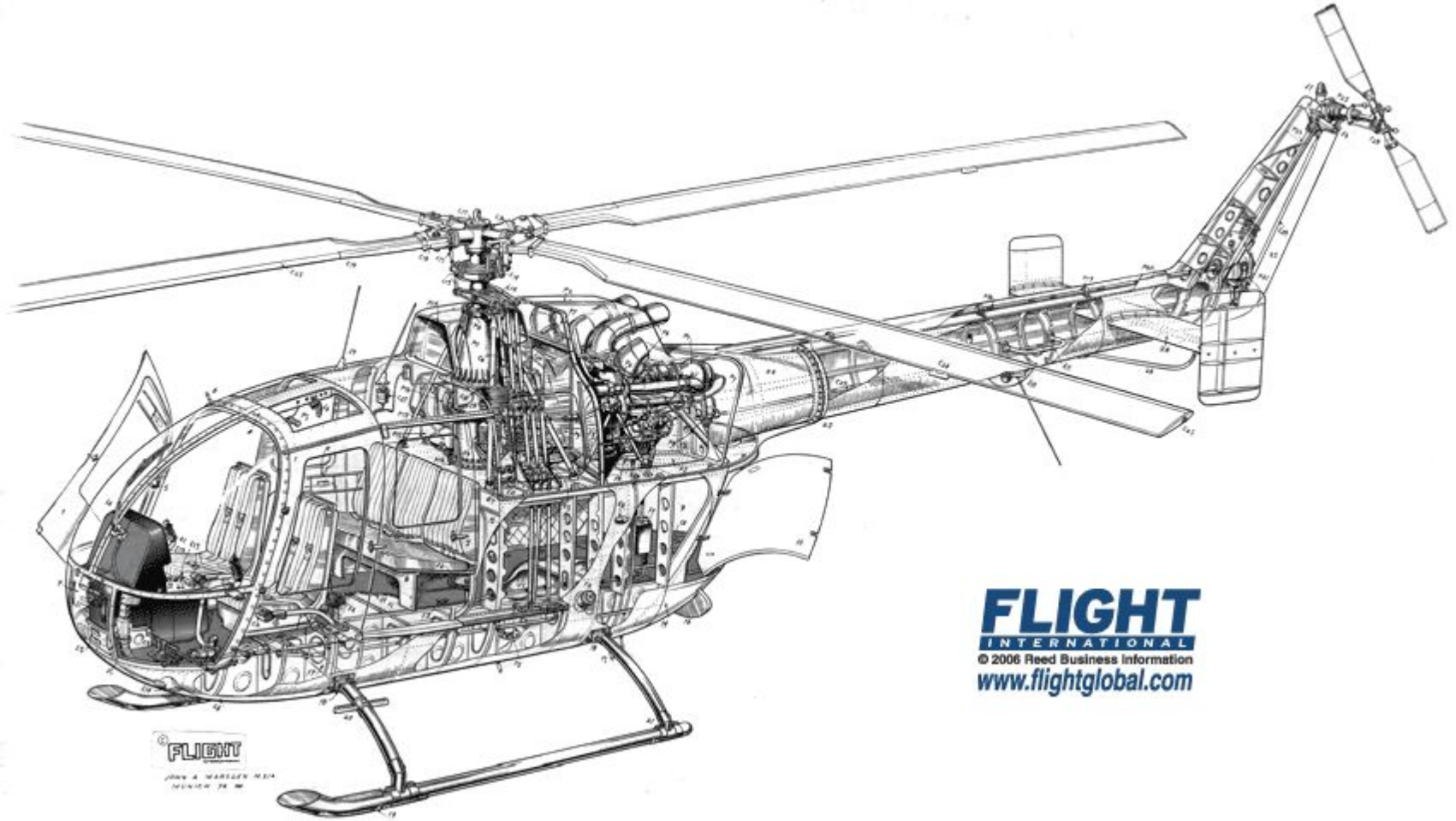
1 Passenger cabin
2 Driver's position
3 Top-half entrance door
4 Lower-half entrance door, forming loading ramp
5 Towing and mooring points
6 Battery locker (24V, 40Amp/hr)
7 Anchor stowage
8 Searchlight
9 Pitot head
10 Forward steaming light
11 Radar scanner
12 Amber rotating beacon
13 Engine ram-air intake with Knitmesh filter
14 Main engine air intake with Knitmesh filters (airflow follows white arrows)
15 Glass-fibre moulded fan intake
16 Upper fan-cone casing
17 Plenum chamber
18 Centre buoyancy tank
19 Rudders
20 Elevators
21 Fin-support tubes
22 Fin attachment points
23 Aft mooring points
24 Servicing platform, propeller and aft control surfaces
25 Plenum-chamber support bracing tubes
26 Side buoyancy tanks
27 Reduxed Z-stringers
28 Buoyancy tank vents
29 Hardstanding pads (six)
30 Air-cushion feed
31 Side body/centre body joints, quickly released for transporting craft
32 Tubular outriggers
33 Outer-body support frames
34 4ft deep flexible skirt (6ft lengths can be lifted independently)
35 Skirt inner wall
36 Piano-hinge skirt attachment
37 Bolted skirt joint
38 Skirt-retraction jacks (four)
39 Skirt-retraction chains in down position
40 Air curtain, skirt down
41 Spilled cushion air
42 Skirt spill holes
43 Fuel-bay access panel
44 Main fuel tank bay (265 Imp gal carried in flexible bag)
45 Fuel filler cap
46 Fuel filter
47 Electrically driven 1-p fuel pump (delivering to engine h-p pump)
48 Oil cooler
49 Oil cooler air outlet
50 Aft fuel-ballast tank
51 Forward fuel-ballast tank (port and starboard)
52 Fuel-ballast transfer pipe
53 Windscreen wash reservoir
54 Electrically driven windscreen wipers
55 Bleed duct to bucket rudder
56 Bucket rudders
57 Panniers
58 VHF radio mast
59 Aft steaming and mooring lights
60 Navigation lights
61 Non-slip walkways
62 Fire zone
63 Fire-suppression bottles
64 Two inflatable liferafts
65 Compass flux valve
66 Side-thrust ducts (that at port rear omitted for clarity)
67 Duct door
68 Door jack
69 Radar screen (cross-Channel layout)
70 Whip aerials

Powerplant
p1 Oil tank
p2 Oil-tank filler
p3 Engine air intake
p4 Hinged access panels (opening either side)
p5 Bristol Siddeley Marine Gnome 900 s.h.p. free turbine
p6 Engine-support tubes
p7 Engine-bay firewall
p8 Engine-bay venting filter
p9 Bifurcated exhaust ducts
p10 1.6kW generator and mounting (cog-belt drive)
p11 Primary engine-reduction gearbox
p12 Aft-mounting support tubes
p13 Secondary gearbox drive-shaft
p14 Secondary gearbox bracing struts
p15 Secondary bevel-drive gearbox
p16 Inspection cover
p17 Oil jet to bevel gears
p18 Oil return pipe
p19 Aft cone to gearbox seal
p20 Propeller drive shaft
p21 Aft-steady roller bearing
p22 Aft support struts
p23 Roller bearings
p24 Dowty-Rotol 9ft reversing propeller
p25 Engine oil filter
p26 7ft centrifugal fan
p27 Fan thrust bearing

Controls
c1 Control console
c2 Rudder pedals
c3 Instrument panel
c4 Skirt control
c5 Propeller pitch and engine controls
c6 Elevator control lever
c7 Control runs (outside cabin wall)
c8 Rudder controls
c9 Rudder inter-connecting rod
c10 Elevator controls

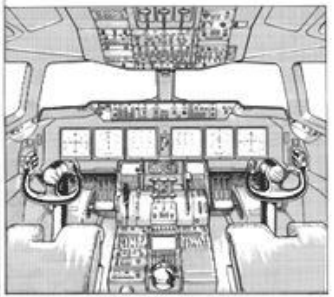
Air conditioning (to customer's requirement)
a1 Fresh-air inlet (Venetian-blind shutters)
a2 Air circulating fans (standard)
a3 Evaporator and water extractor
a4 Fresh-air and recirculating ducts (air down both sides, through holes and up the centre)
a5 Air-from-cabin duct (tube along starboard side of engine fairing to eye of fan)
a6 Compressor
a7 Generator
a8 Compressor and generator gearbox and drive shaft

Since appearing in April 1965 the 7 ton, 38-passenger N6 has logged sterling service on pioneer transport services, and now links Britain and France. A military supply version has been ordered for the British Army



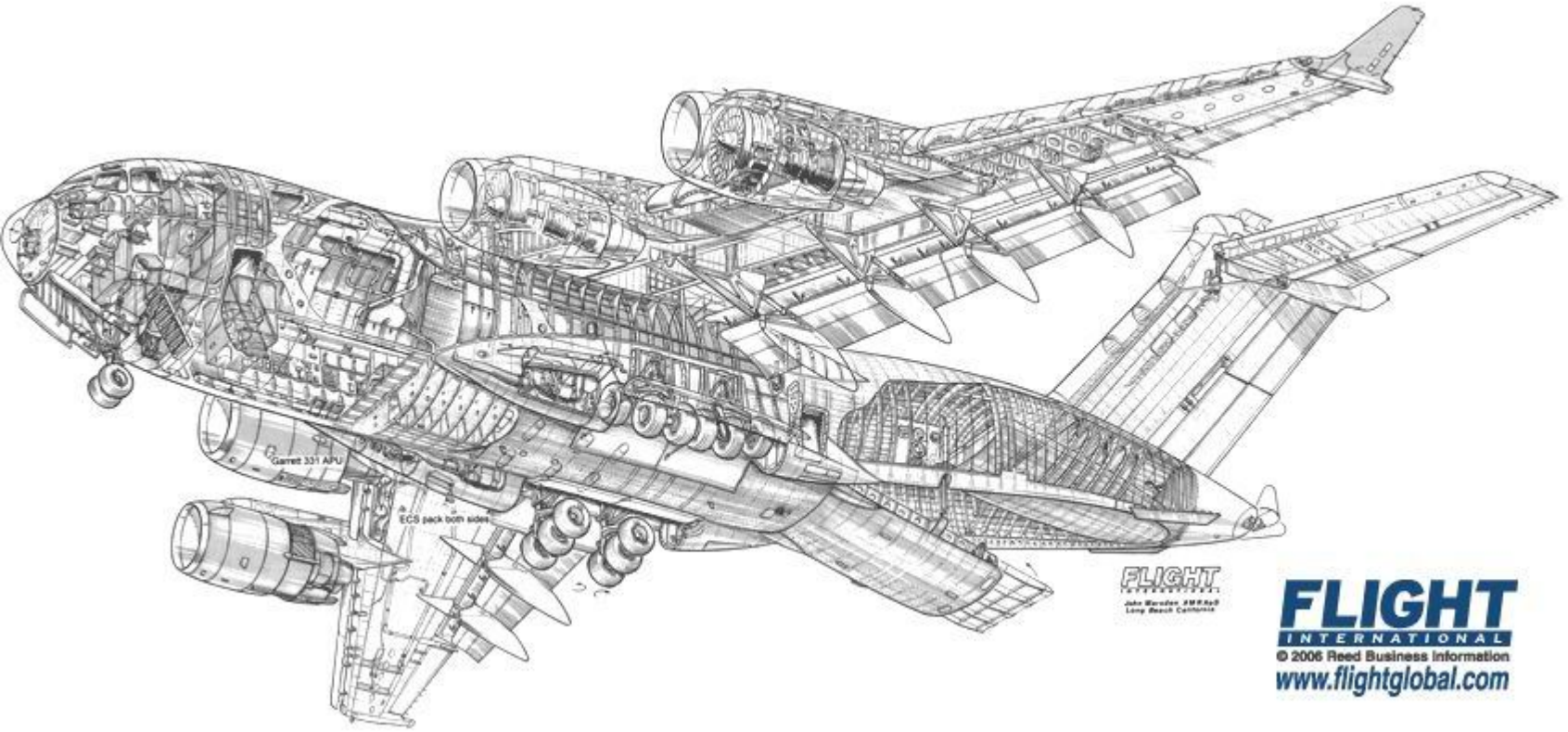
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McDONNELL DOUGLAS MD-11



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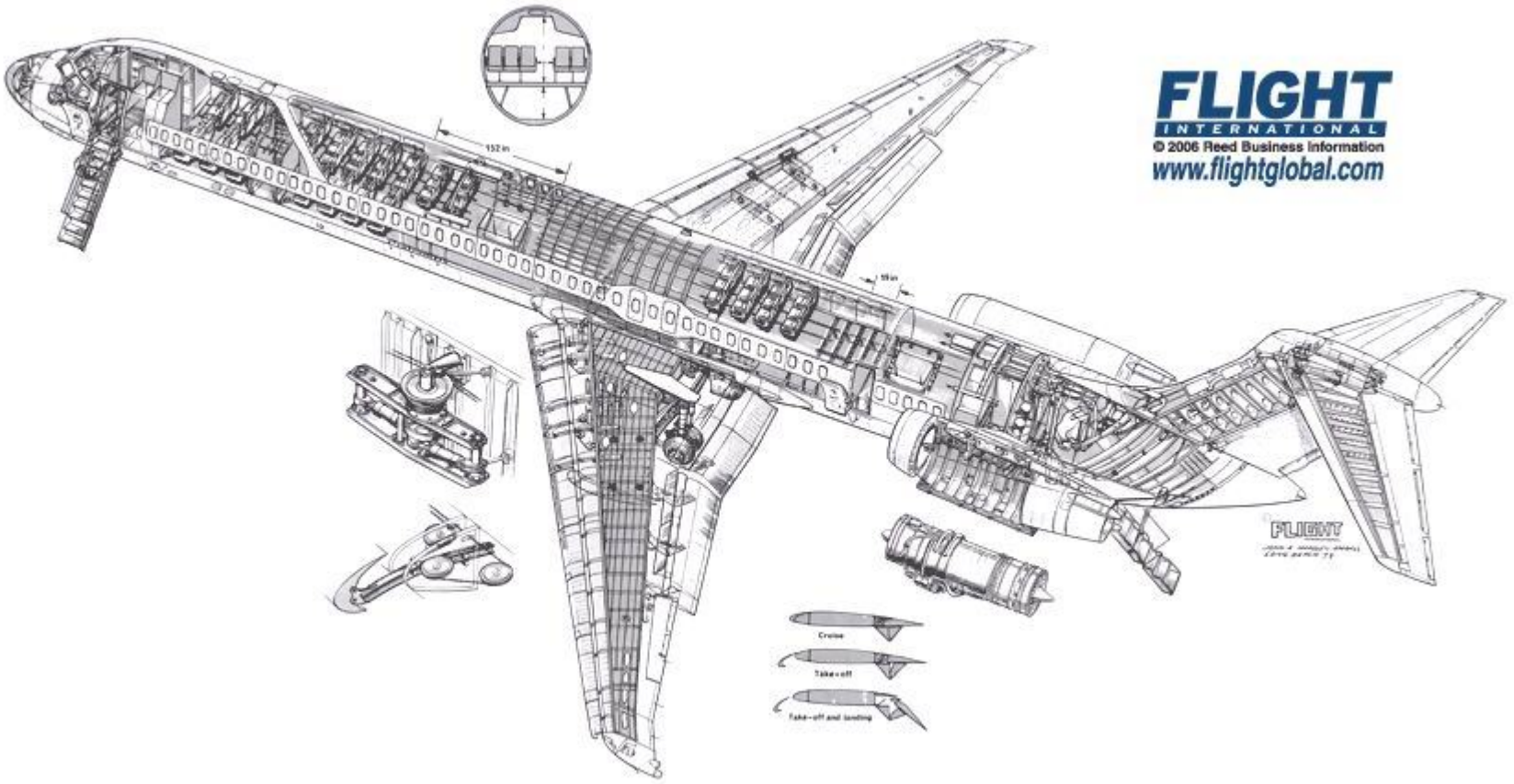
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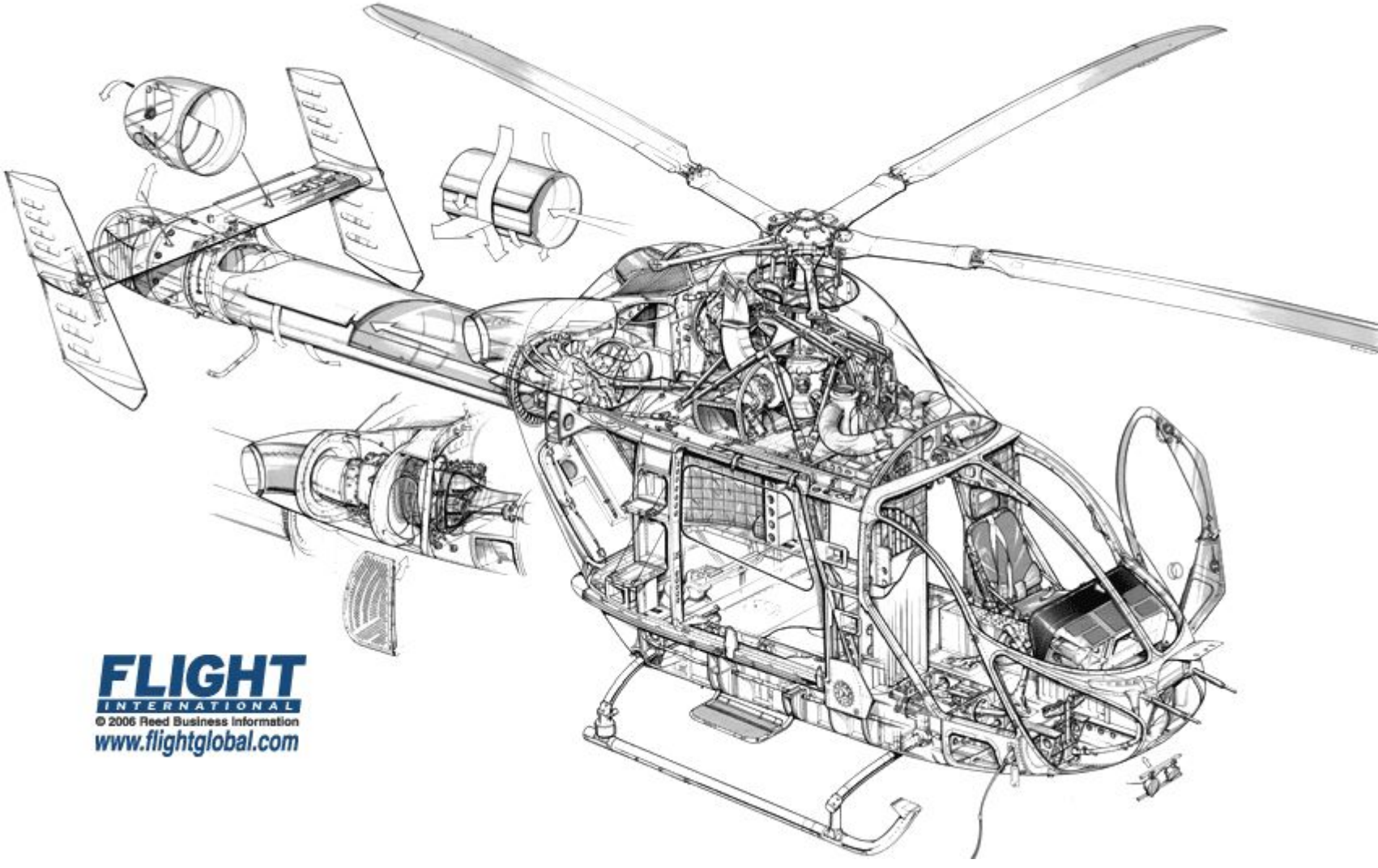


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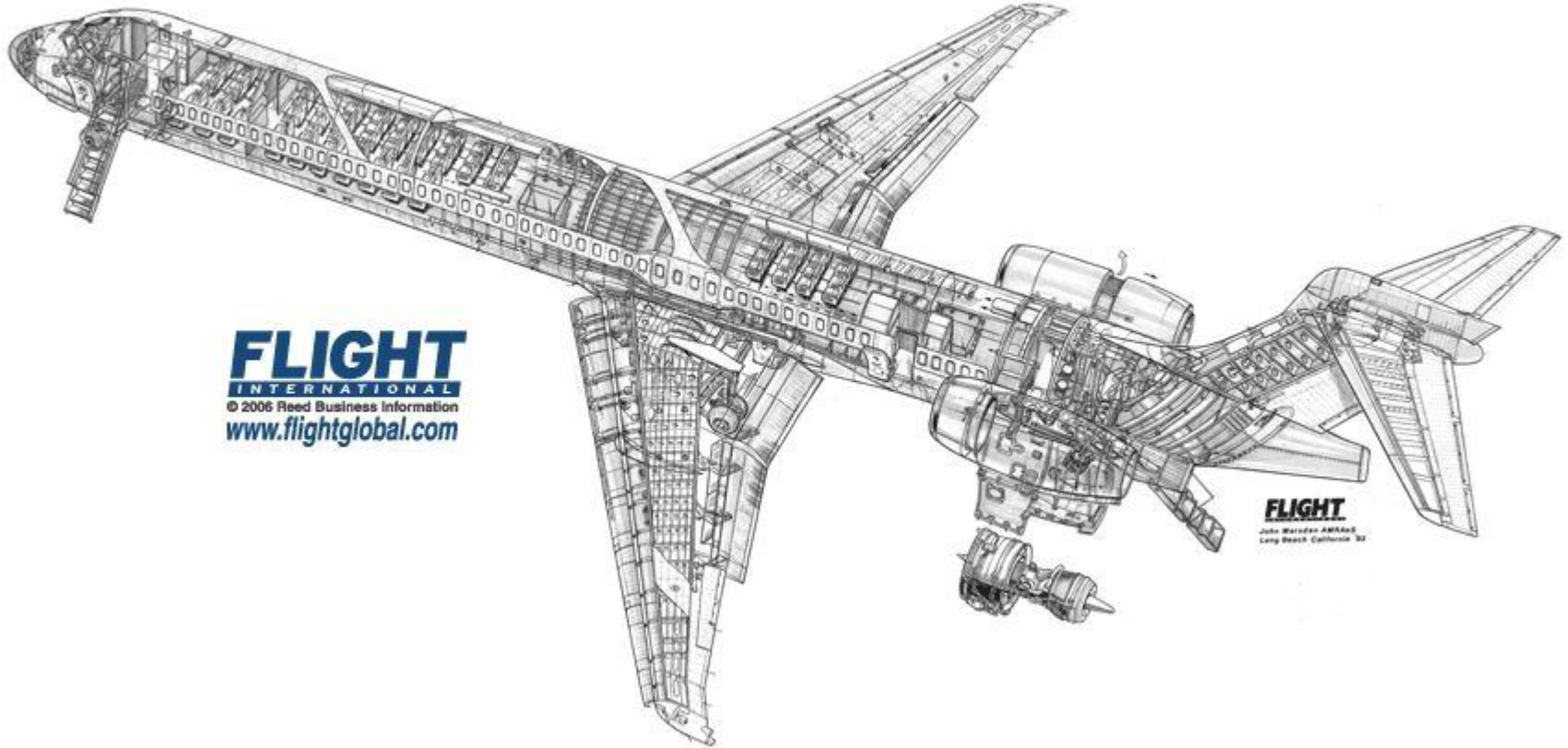
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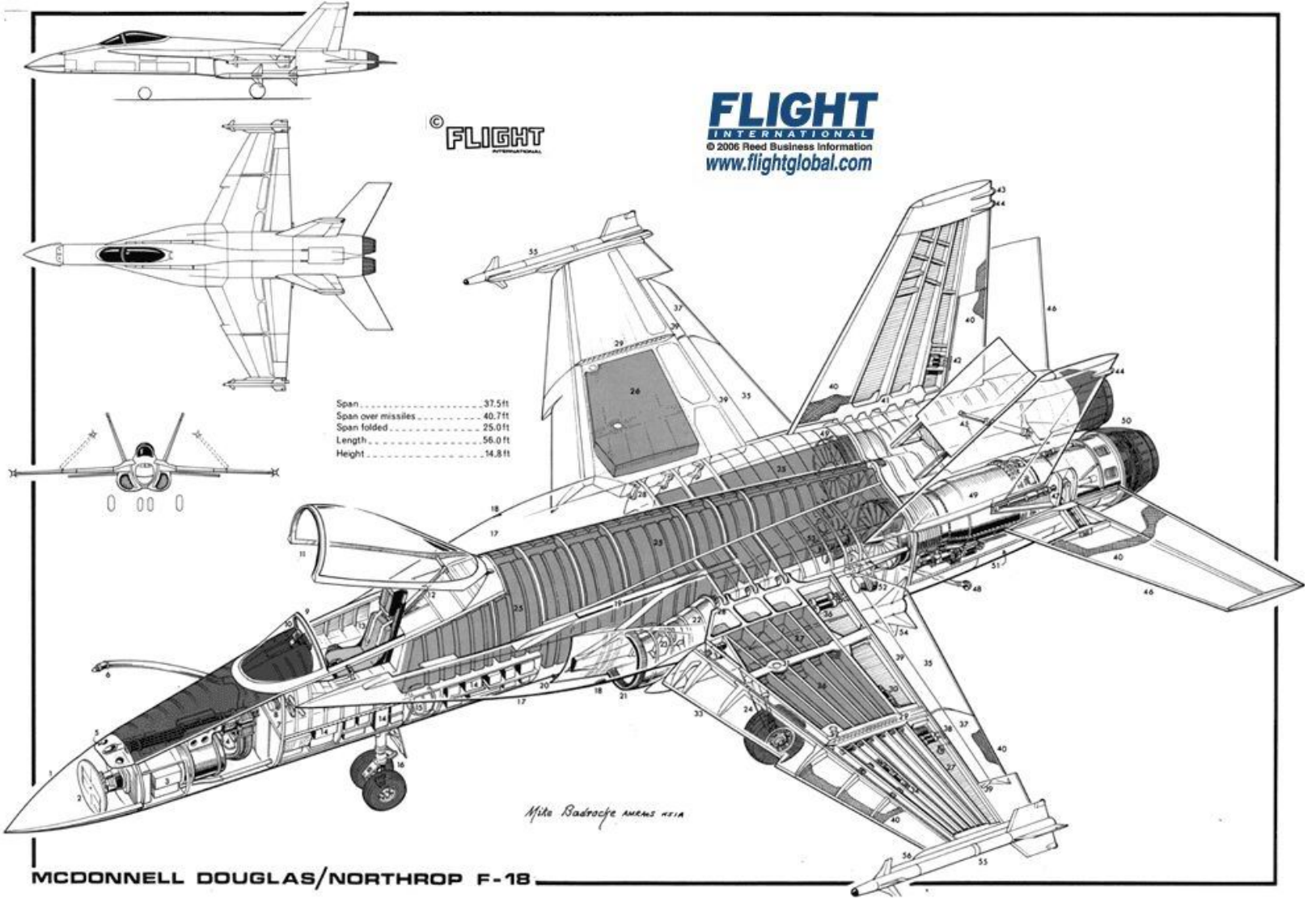
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Cruise
Take-off
Take-off and landing



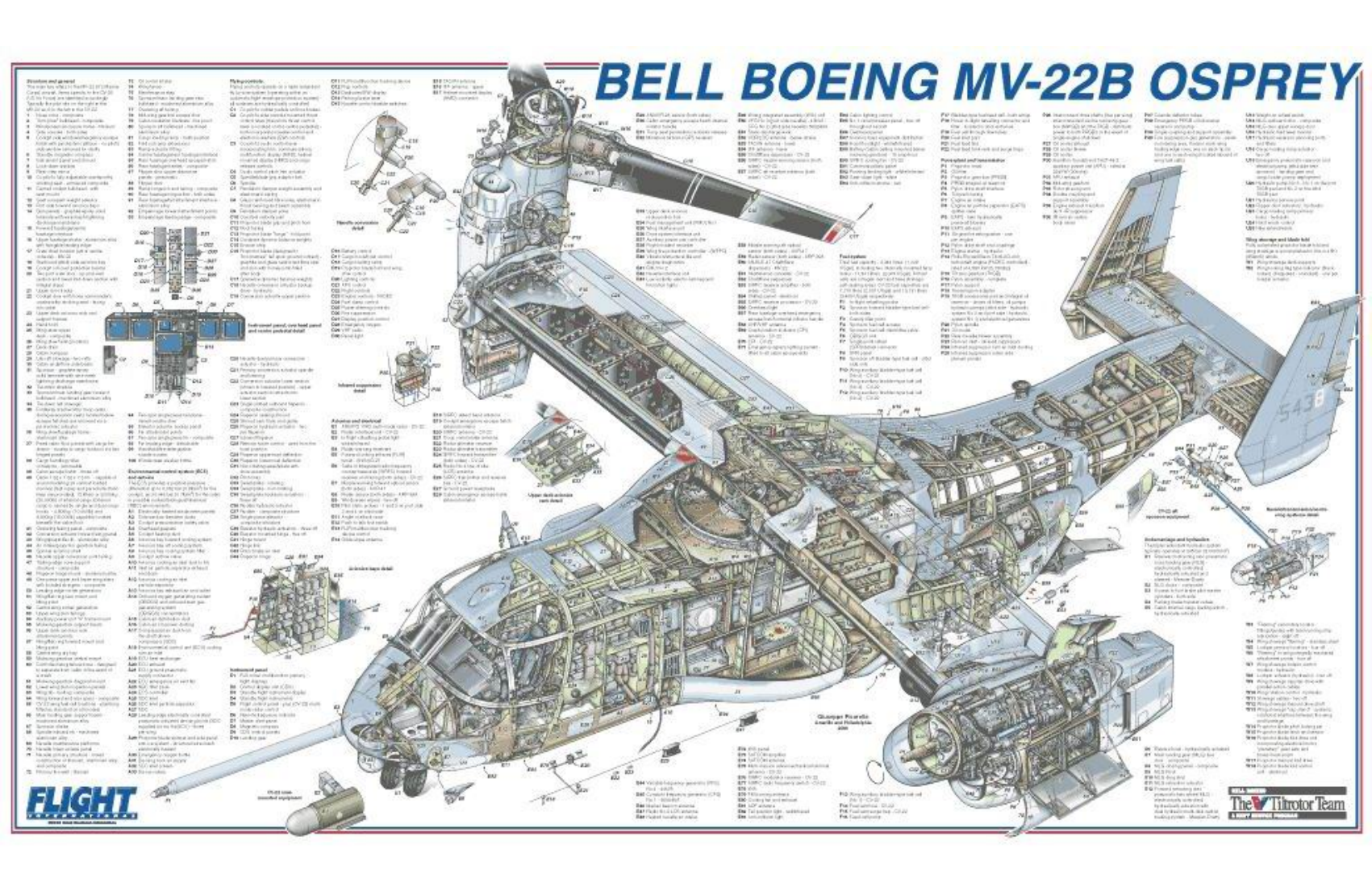
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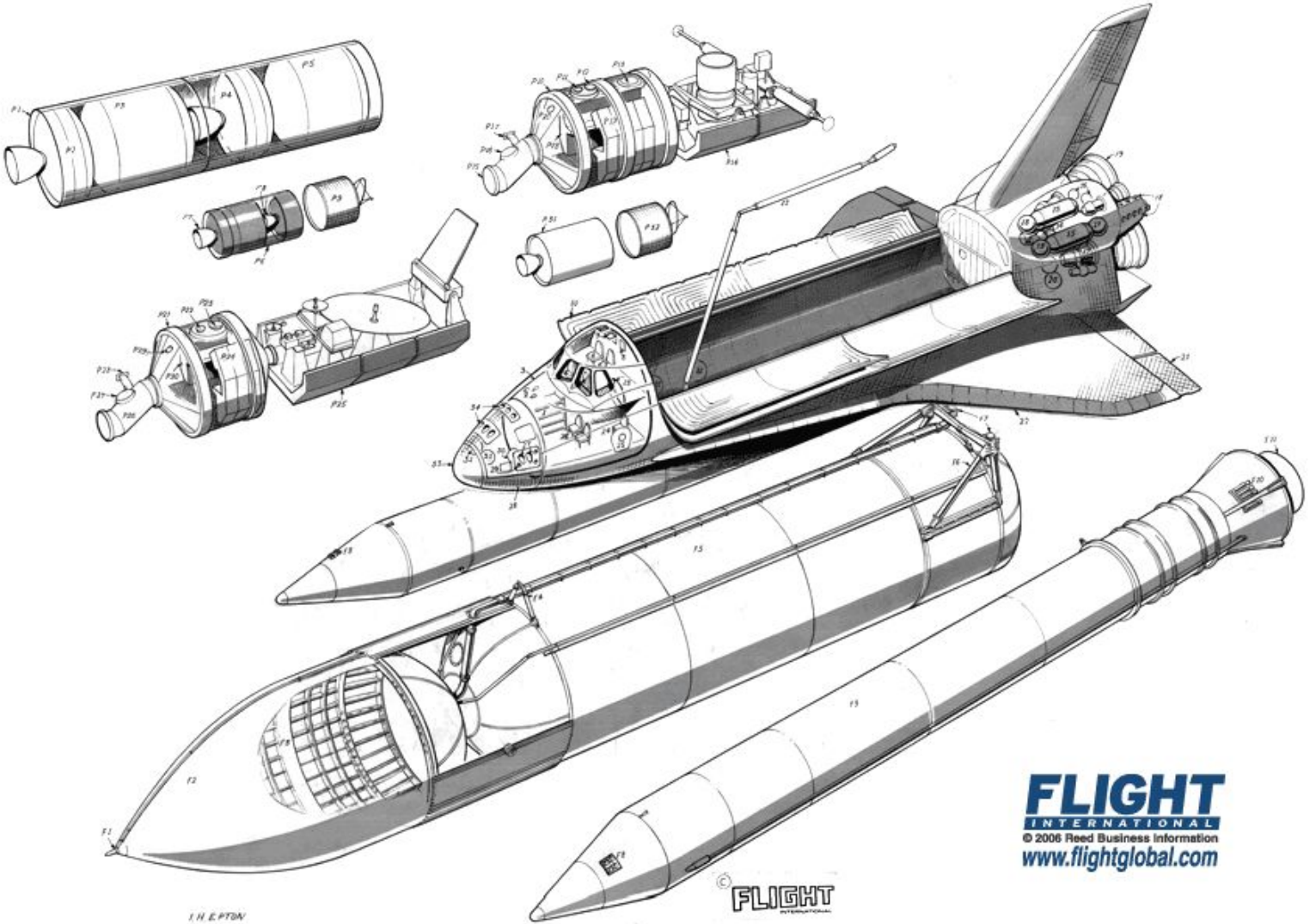
MCDONNELL DOUGLAS/NORTHROP F-18

BELL BOEING MV-22B OSPREY



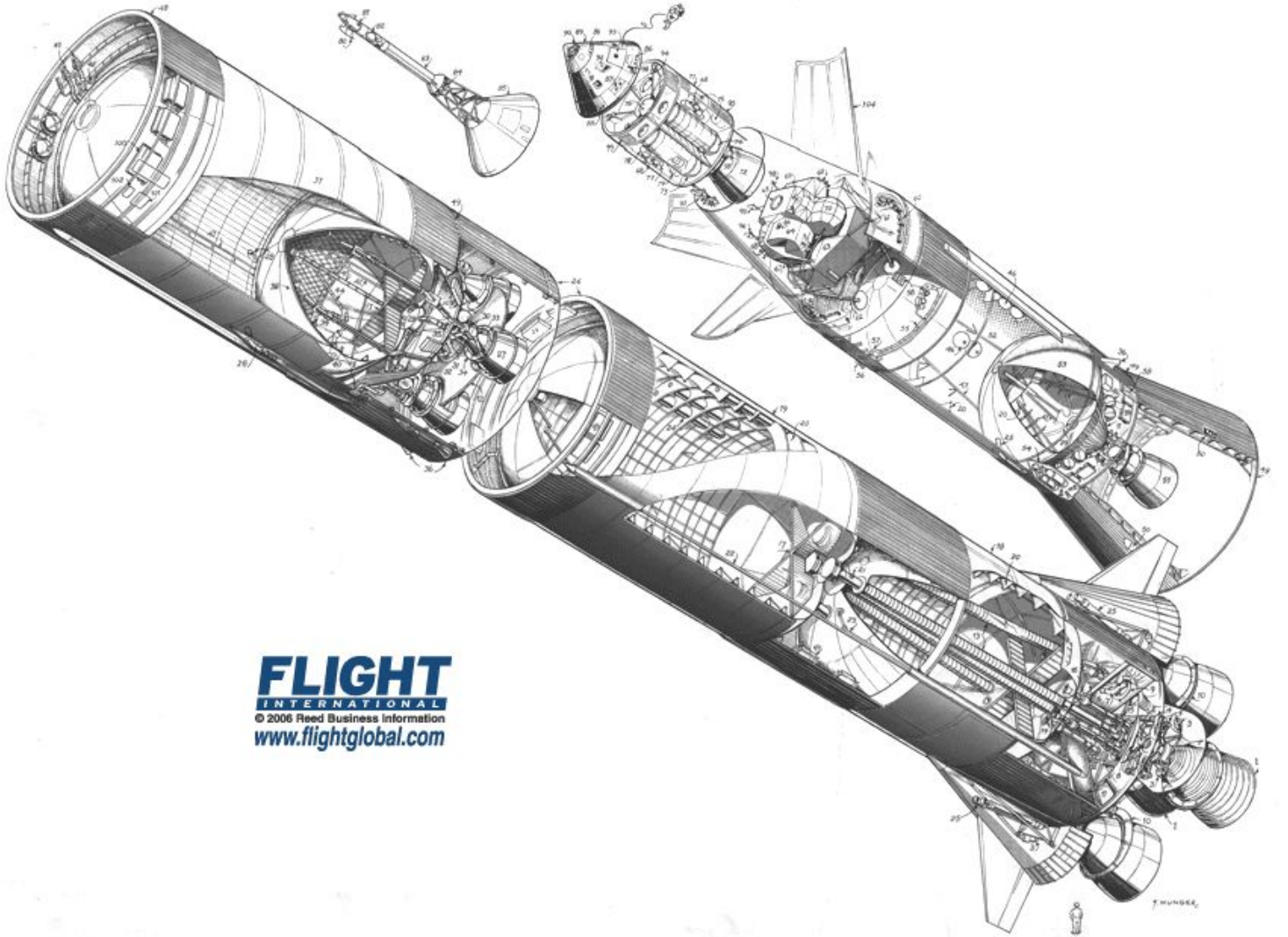
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The Tiltrotor Team

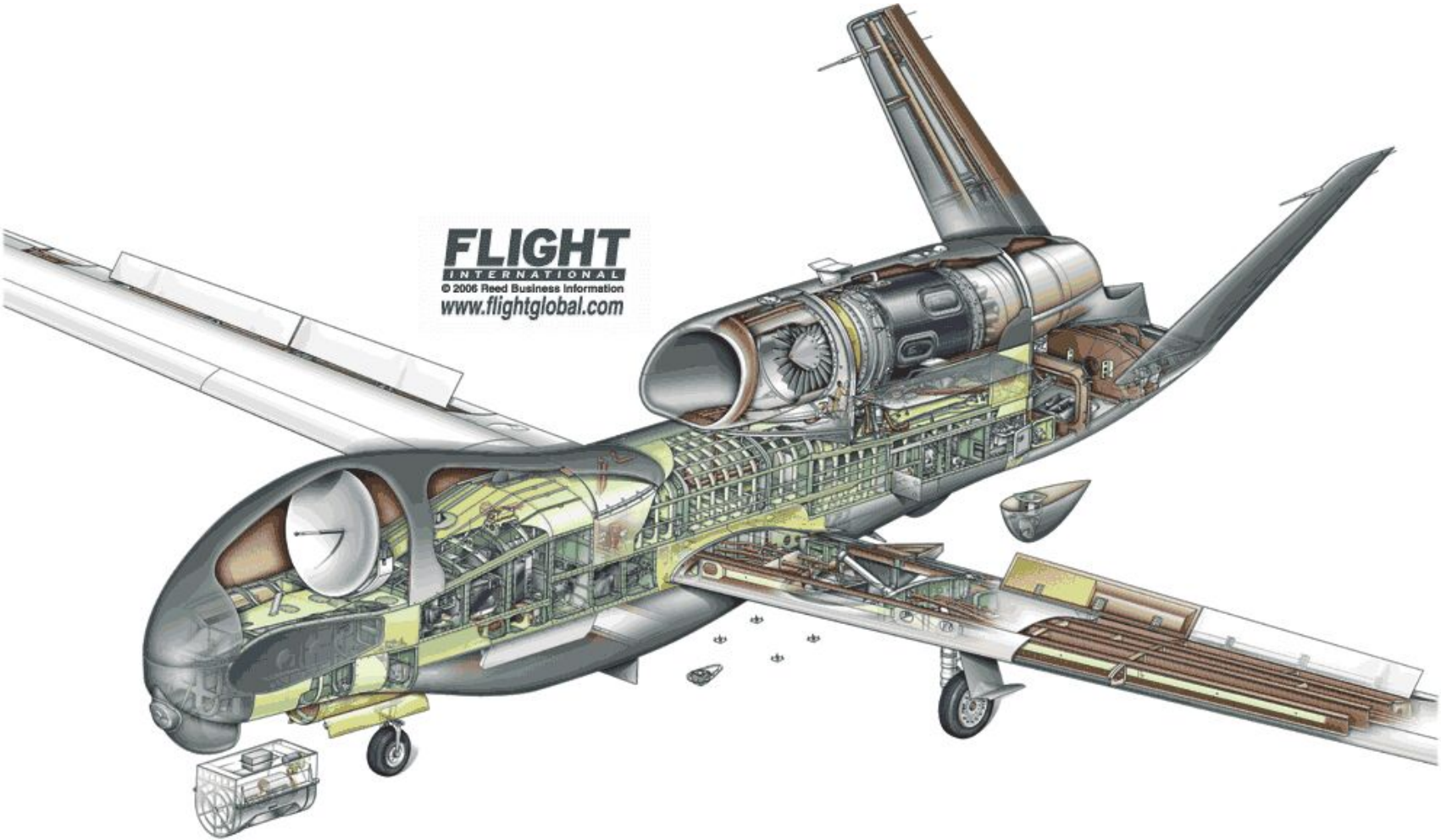


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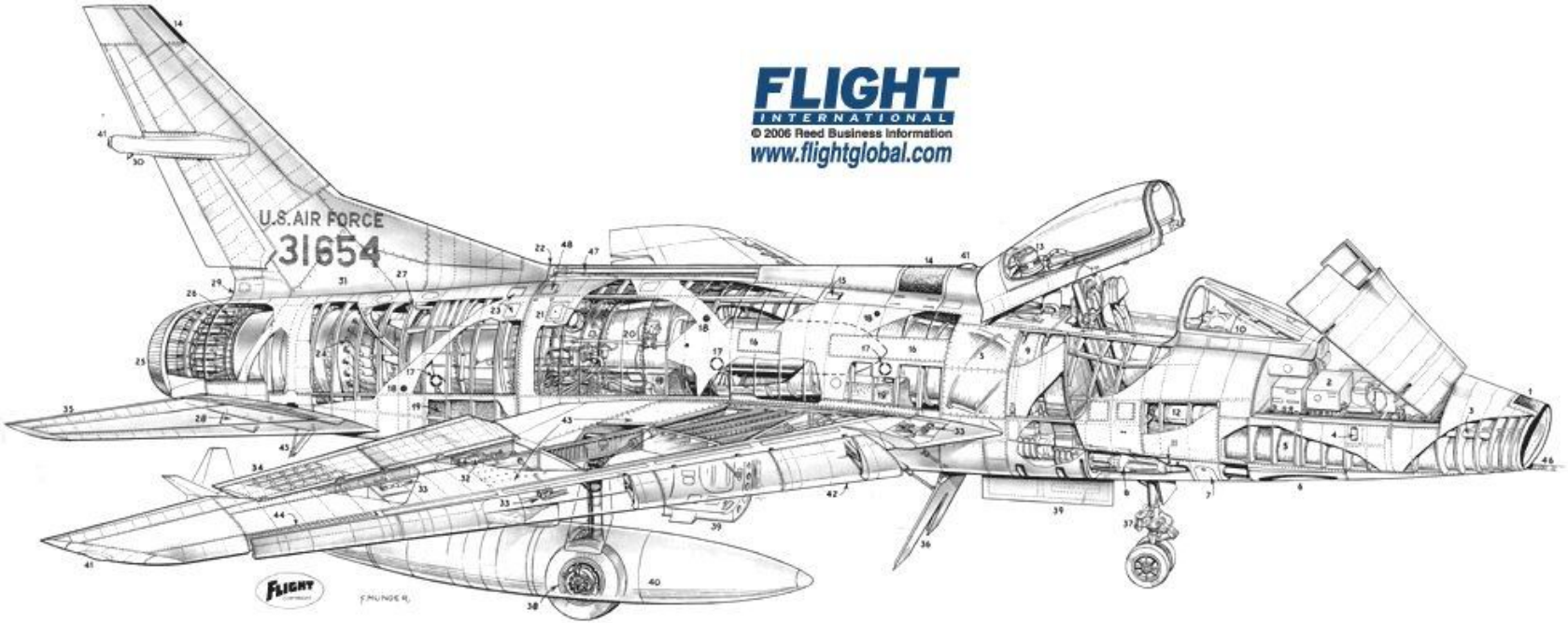
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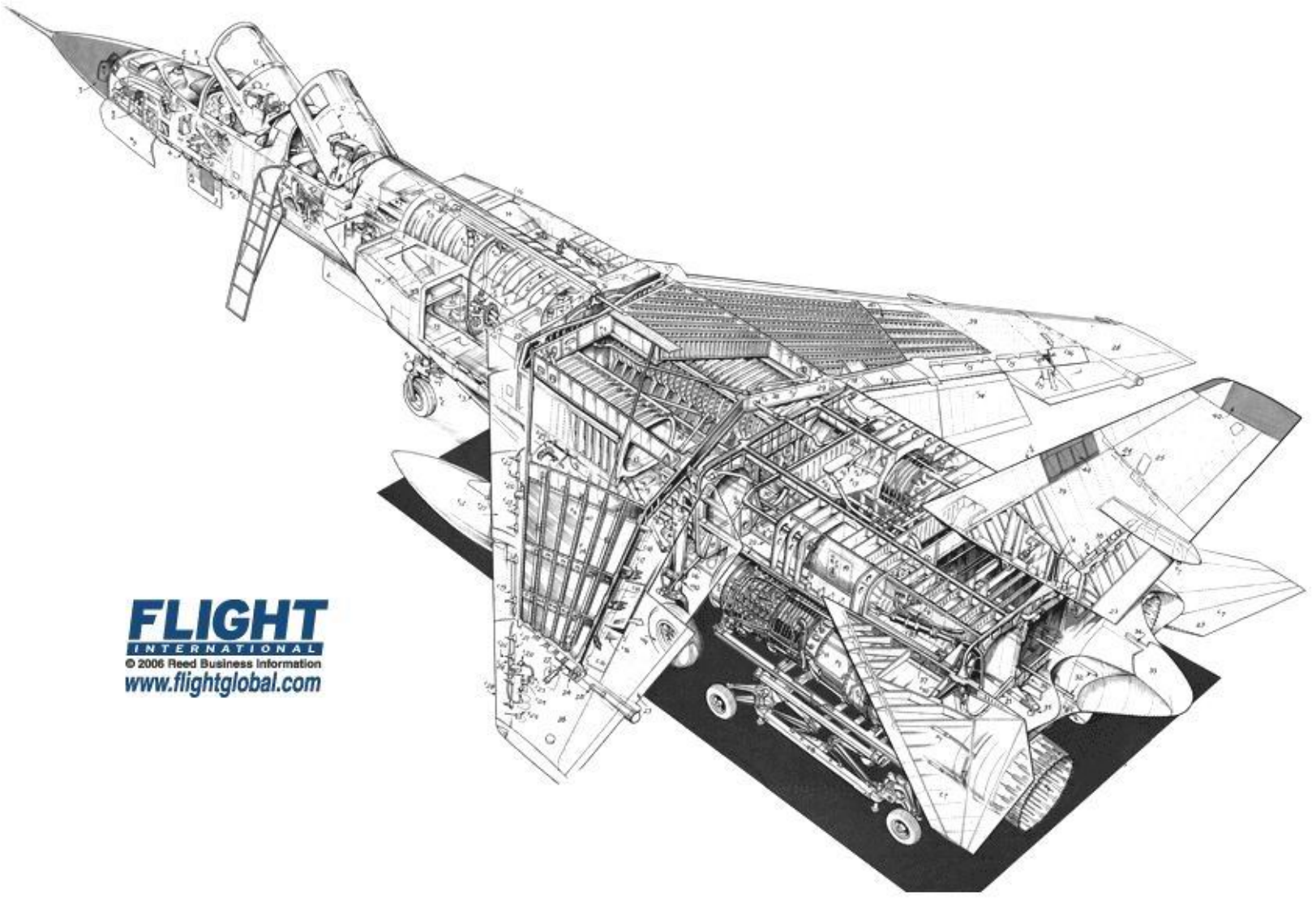


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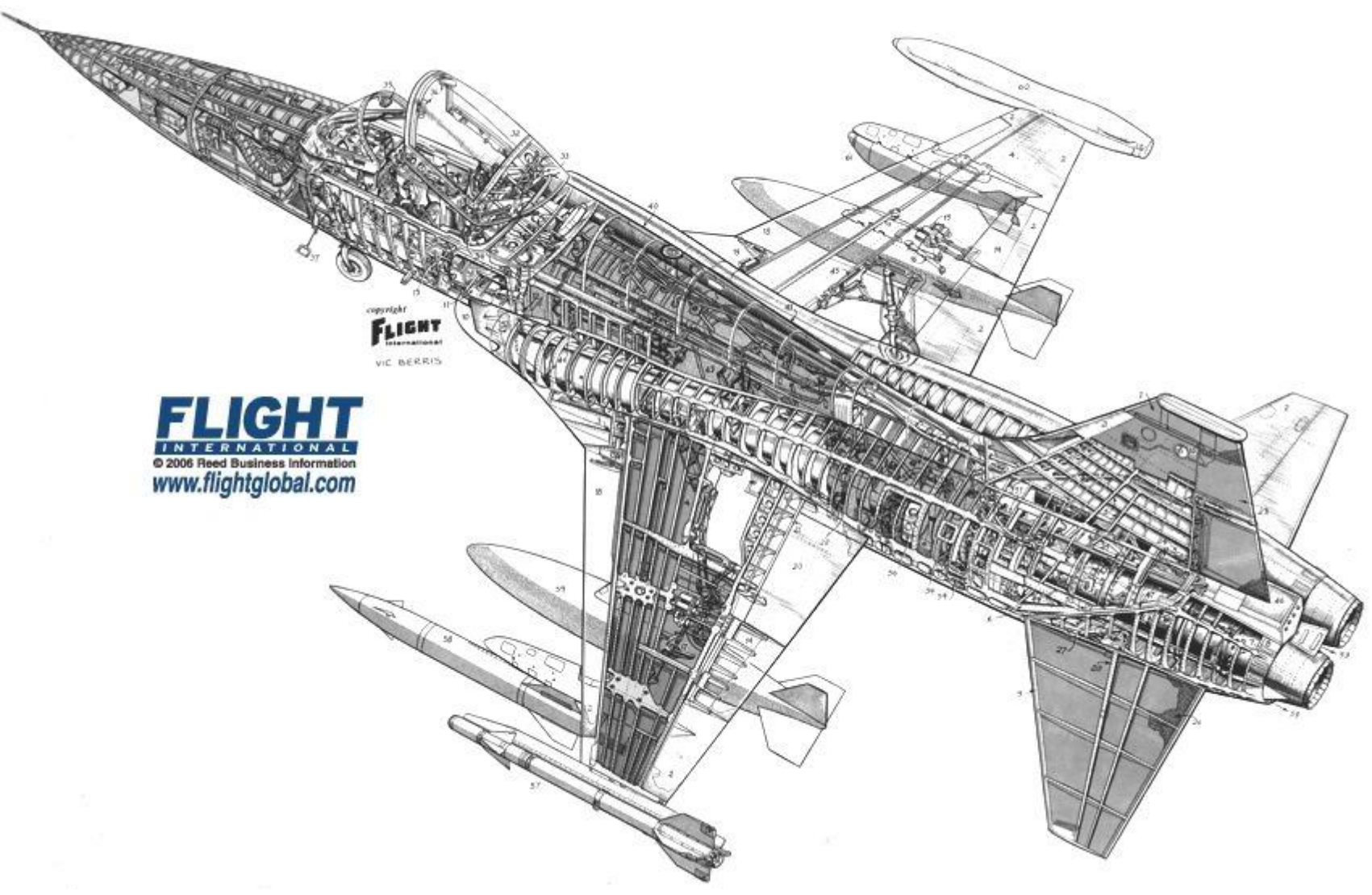

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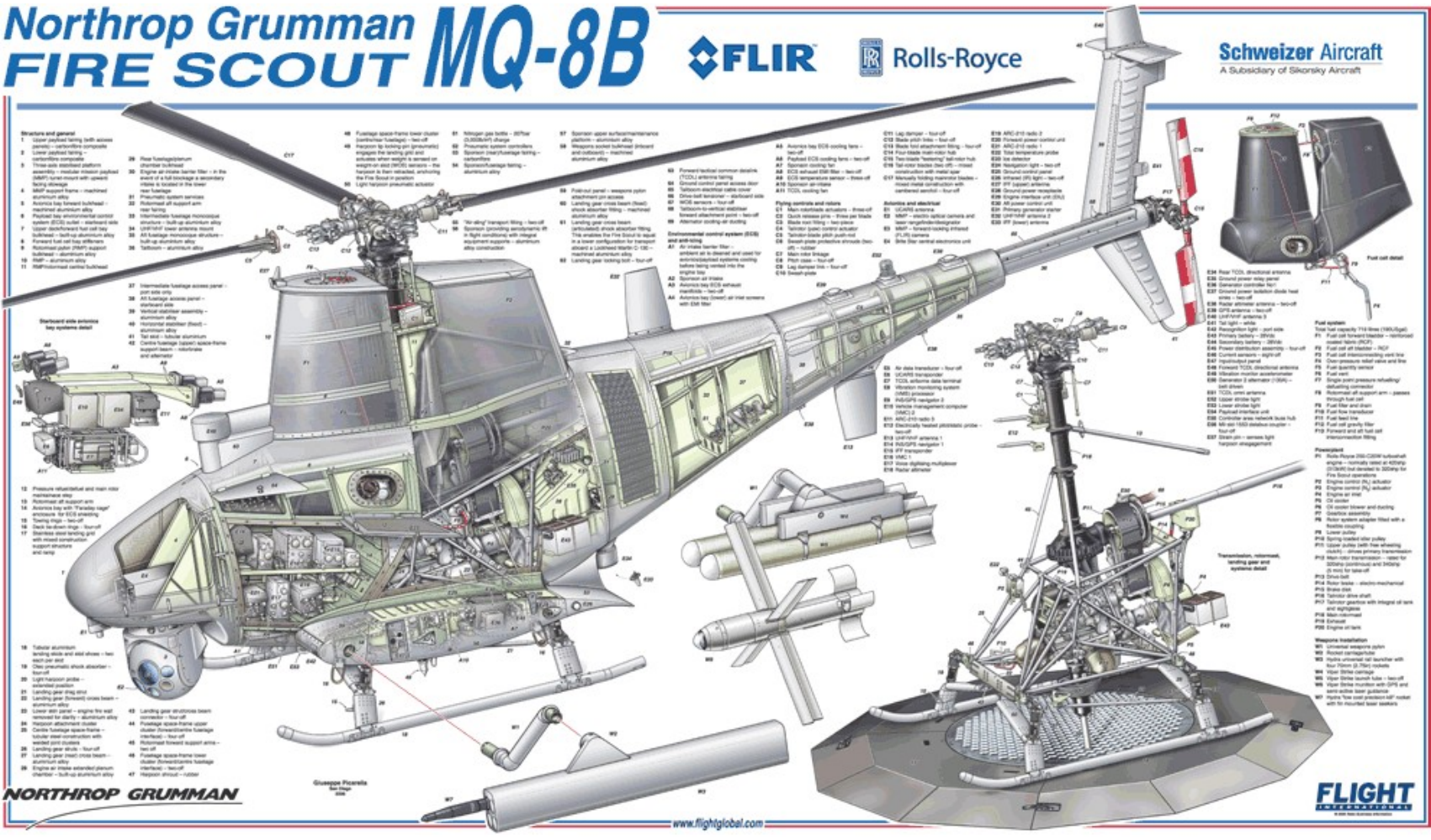
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Northrop Grumman FIRE SCOUT MQ-8B

FLIR

Rolls-Royce

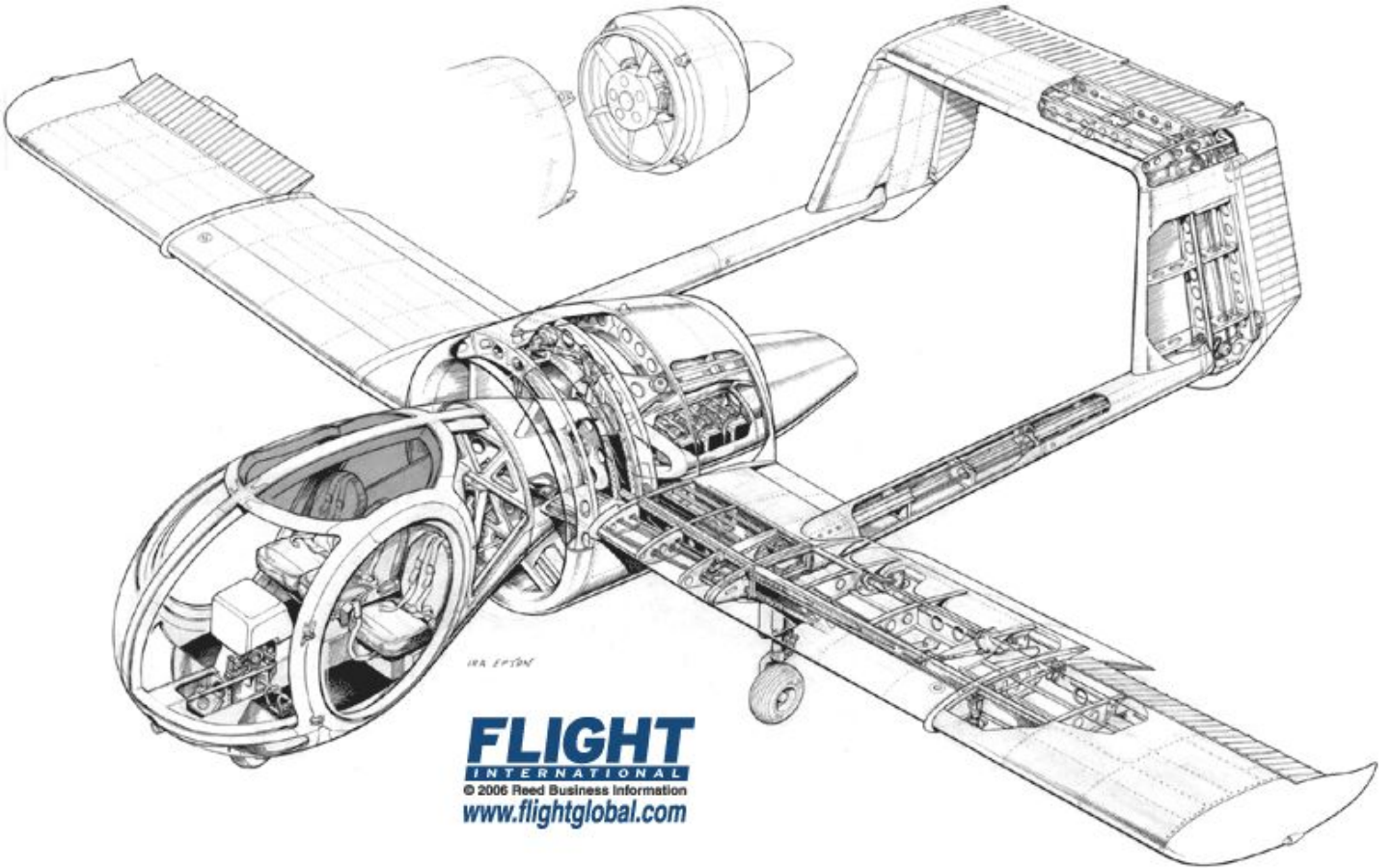
Schweizer Aircraft
A Subsidiary of Sikorsky Aircraft



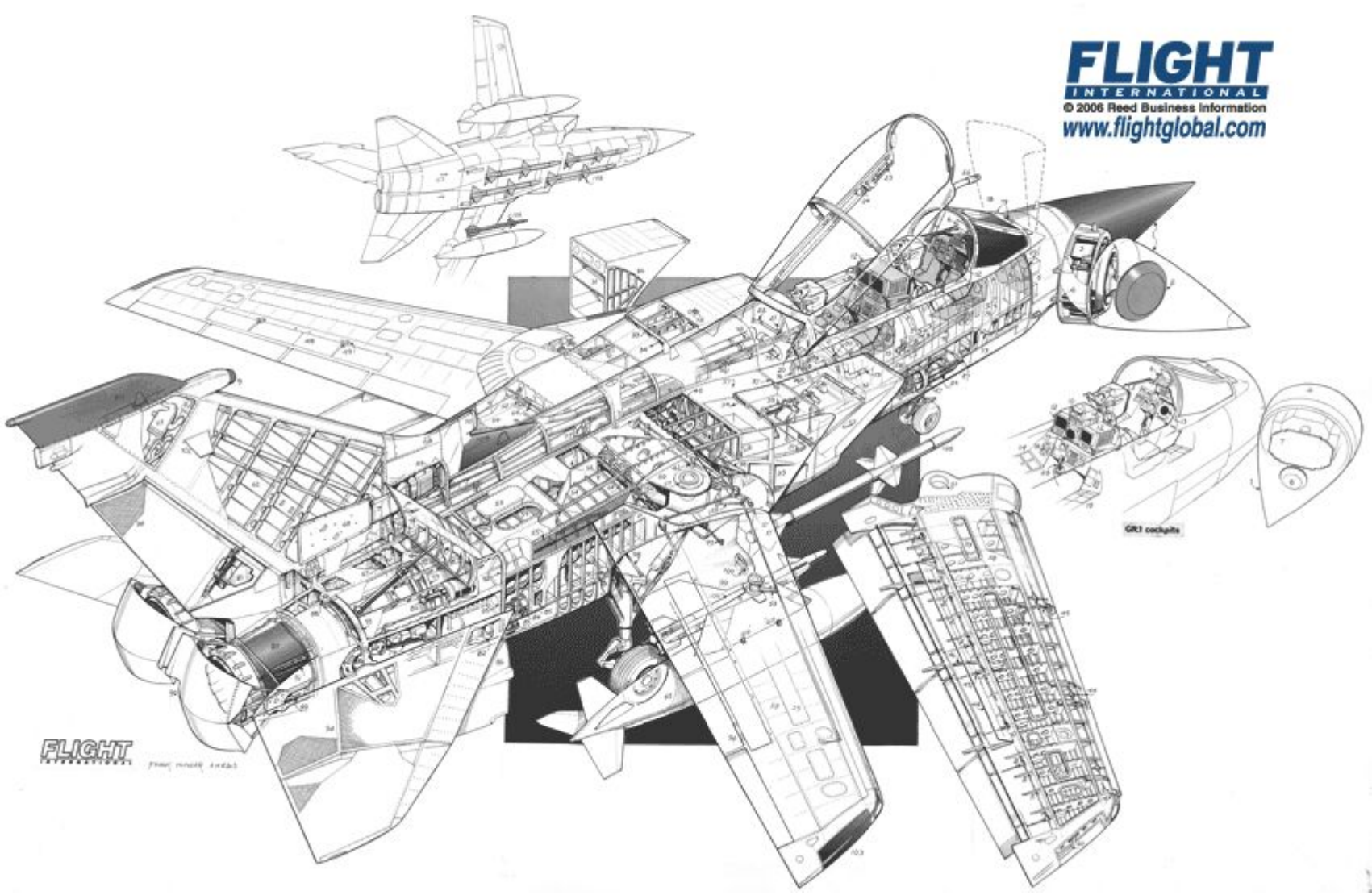
NORTHROP GRUMMAN

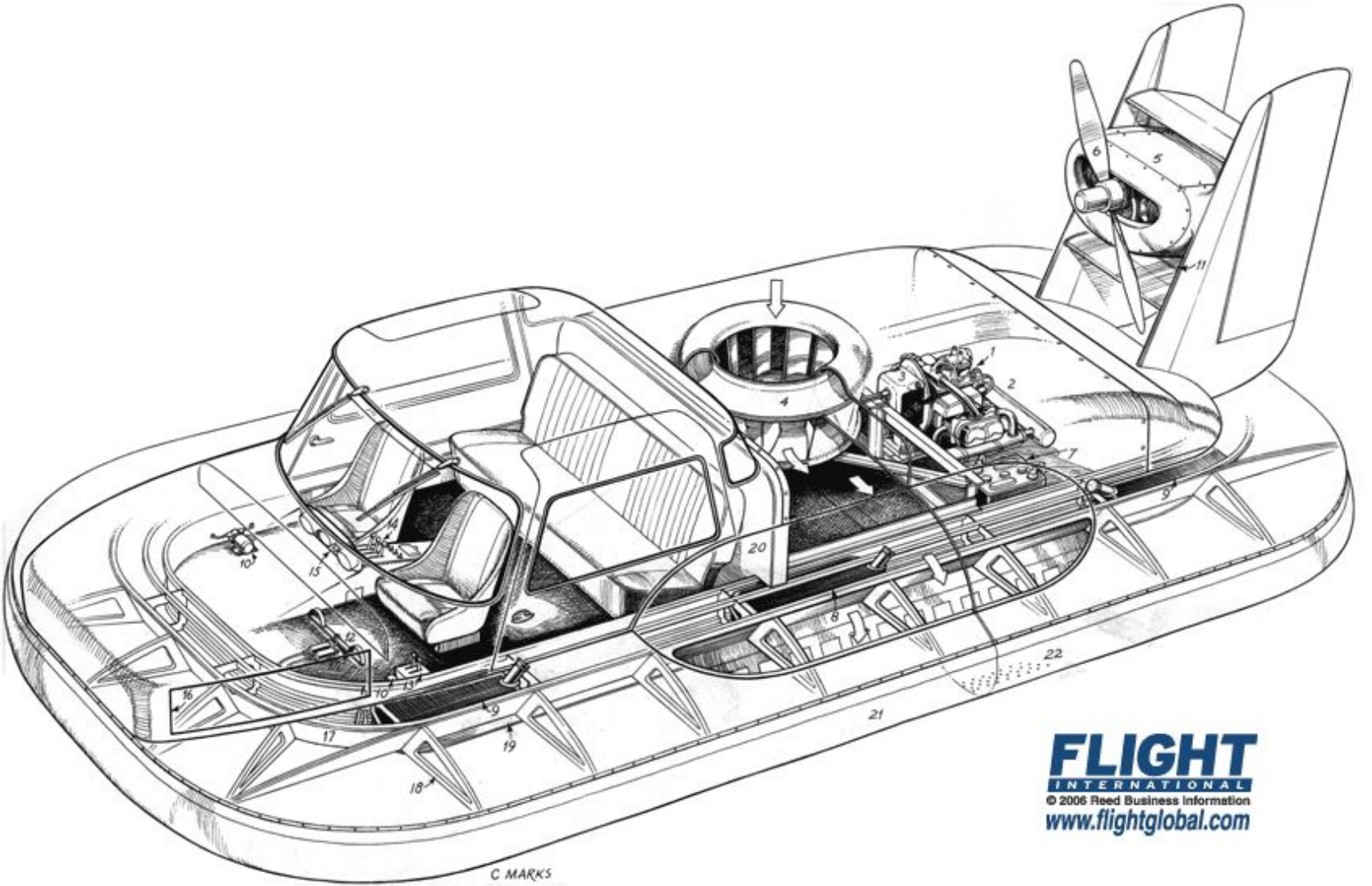
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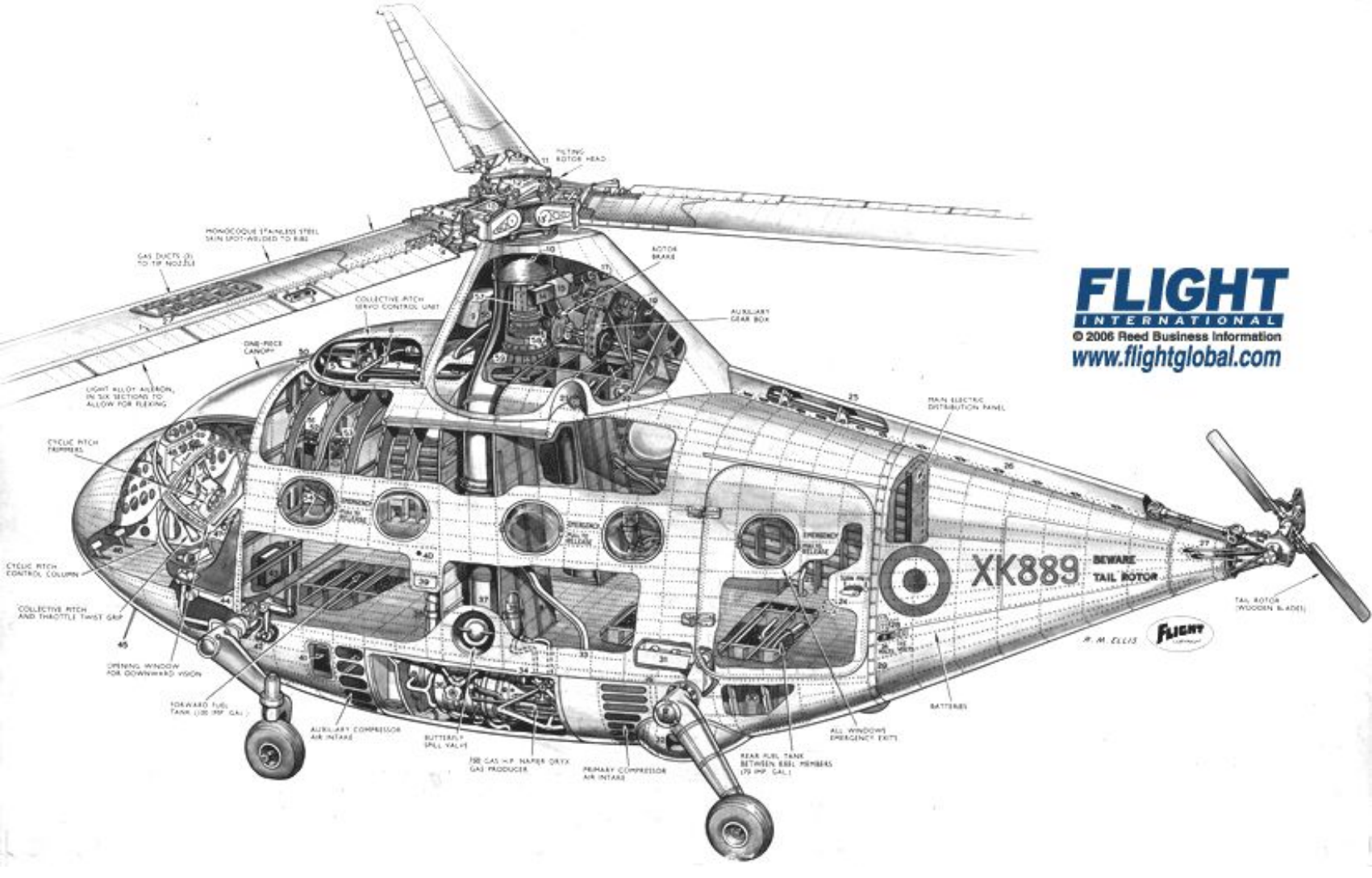


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GR1 cockpits
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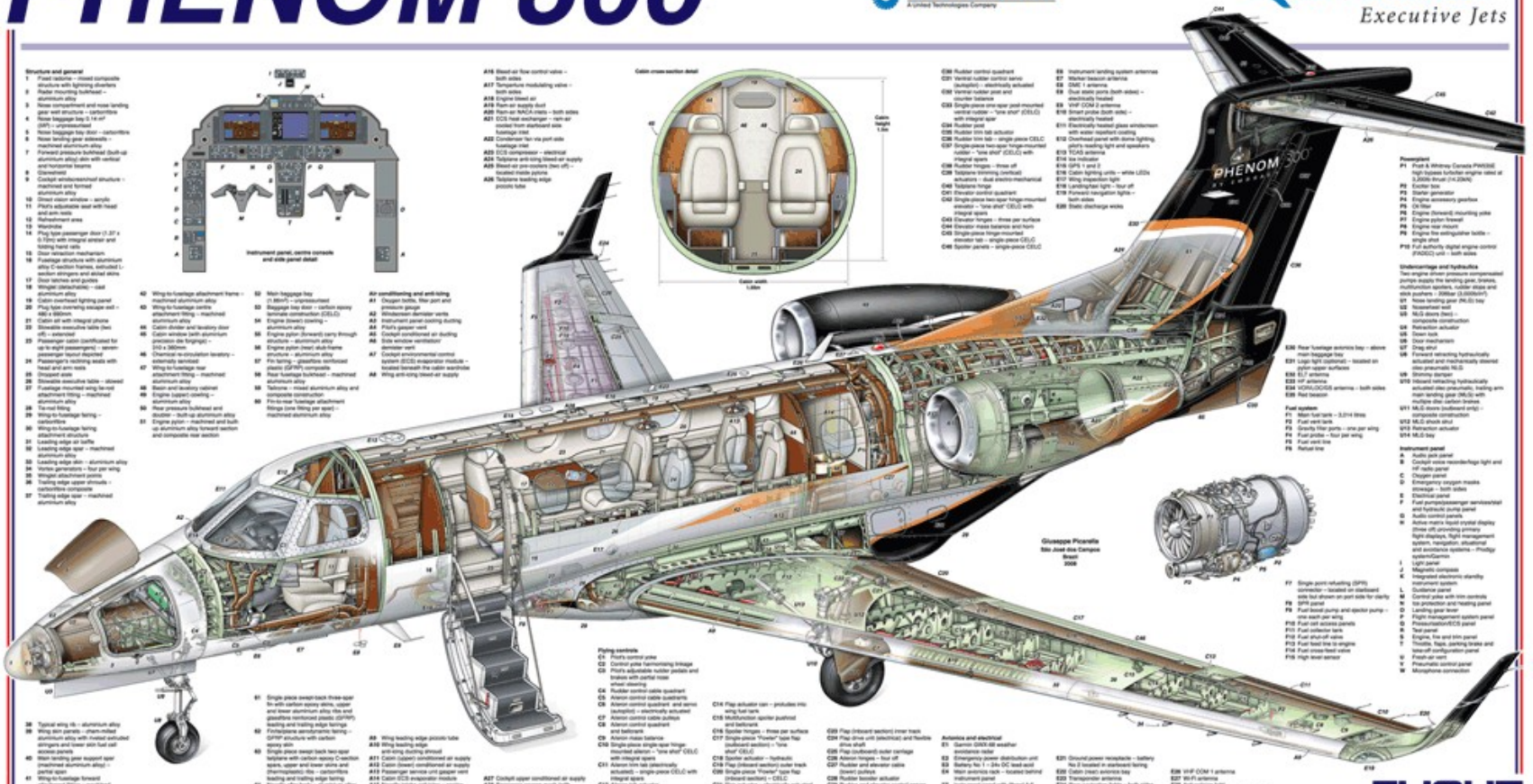


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PHENOM 300

Pratt & Whitney Canada
A United Technologies Company

EMBRAER
Executive Jets



Instrument panel, centre console and side panel detail

Cabin cross-section detail

Cabin height 1.83m

Cabin width 1.88m

Structure and general

1 Fixed radome – mixed composite structure with lightning diverters
2 Radar mounting bulkhead – aluminium alloy
3 Nose compartment and nose landing gear well structure – carbonfibre
4 Nose baggage bay 0.14 m³ (5ft³) – unpressurised
5 Nose baggage bay door – carbonfibre
6 Nose landing gear sidewalls – machined aluminium alloy
7 Forward pressure bulkhead (bolt-up aluminium alloy) skin with vertical and horizontal beams
8 Glarshield
9 Cockpit windscreen/roof structure – machined and formed aluminium alloy
10 Direct vision window – acrylic
11 Pilot's adjustable seat with head and arm rests
12 Refreshment area
13 Wardrobe
14 Plug type passenger door (1.37 x 0.72m) with integral airstair and folding hand rails
15 Door retraction mechanism
16 Fuselage structure with aluminium alloy C-section frames, extruded L-section stringers and skilad skins
17 Door latches and guides
18 Winglet (detachable) – cast aluminium alloy
19 Cabin overhead lighting panel
20 Plug type overwing escape exit – 480 x 660mm
21 Cabin aft unit with integral phone
22 Stowable executive table (two off) – carpeted
23 Passenger cabin (certificated for up to eight passengers) – seven passenger layout depicted
24 Passenger's reclining seats with head and arm rests
25 Dropped aisle
26 Stowable executive table – stowed
27 Fuselage mounted wing fai-ing/ attachment fitting – machined aluminium alloy
28 Tail fairing
29 Wing-to-fuselage fairing – carbonfibre
30 Wing-to-fuselage fairing attachment structure
31 Leading edge air baffle
32 Leading edge spar – machined aluminium alloy
33 Leading edge skin – aluminium alloy
34 Vortex generators – four per wing
35 Winglet attachment points
36 Trailing edge upper shrouds – carbonfibre composite
37 Trailing edge spar – machined aluminium alloy
42 Wing-to-fuselage attachment frame – machined aluminium alloy
43 Wing-to-fuselage centre attachment fitting – machined aluminium alloy
44 Cabin divider and lavatory door
45 Cabin window (with aluminium precision die forgings) – 310 x 380mm
46 Chemical re-circulation lavatory – externally serviced
47 Wing-to-fuselage rear attachment fitting – machined aluminium alloy
48 Basin and lavatory cabinet
49 Engine (upper) cowling – aluminium alloy
50 Rear pressure bulkhead and doubler – built-up aluminium alloy
51 Engine pylon – machined and built-up aluminium alloy forward section and composite rear section
52 Main baggage bay (1.86m³) – unpressurised
53 Baggage bay door – carbon epoxy laminate construction (CELC)
54 Engine (lower) cowling – aluminium alloy
55 Engine pylon (forward) carry through structure – aluminium alloy
56 Engine pylon (rear) stub-frame structure – aluminium alloy
57 Fin fairing – glassfibre reinforced plastic (GFRP) composite
58 Rear fuselage bulkhead – machined aluminium alloy
59 Tailcone – mixed aluminium alloy and composite construction
60 Fin-to-rear fuselage attachment fittings (one fitting per spar) – machined aluminium alloy

Air conditioning and anti-icing

A1 Oxygen bottle, filler port and pressure gauge
A2 Windscreen demister vents
A3 Instrument panel cooling ducting
A4 Pilot's gasper vent
A5 Cockpit conditioned air ducting
A6 Side window ventilation/ demister vent
A7 Cockpit environmental control system (ECS) evaporator module – located beneath the cabin wardrobe
A8 Wing anti-icing bleed air supply
A15 Bleed air flow control valve – both sides
A17 Temperture modulating valve – both sides
A18 Engine bleed air
A19 Ram-air supply duct
A20 Ram-air NACA inlets – both sides
A21 ECS heat exchanger – ram-air cooled from starboard side fuselage inlet
A22 Condenser fan via port side fuselage inlet
A23 ECS compressor – electrical
A24 Tailplane anti-icing bleed-air supply
A25 Bleed-air pre-coolers (two off) – located inside pylons
A26 Tailplane leading edge piccolo tube
A27 Cockpit upper conditioned air supply
A28 Passenger oxygen mask (with microphones) compartments

Flying controls

C1 Pilot's control yoke
C2 Control yoke harmonising linkage
C3 Pilot's adjustable rudder pedals and brakes with dorfal nose wheel steering
C4 Rudder control cable quadrant
C5 Aileron control cable quadrants
C6 Aileron control quadrant and servo (autopilot) – electrically actuated
C7 Aileron control cable pulleys
C8 Aileron control quadrant and bellcrank
C9 Aileron mass balance
C10 Single-piece single-spar hinge-mounted aileron – "one shot" CELC with integral spars
C11 Aileron trim tab (electrically actuated) – single-piece CELC with integral spars
C12 Aileron tab actuator
C13 Flap outboard carriage
C14 Flap actuator can – provides into wing fuel tank
C15 Multifunction spoiler pushrod and bellcrank
C16 Spoiler hinges – three per surface
C17 Single-piece "Fowler" type flap (outboard section) – "one shot" CELC
C18 Spoiler actuator – hydraulic
C19 Flap (inboard section) outer track
C20 Single-piece "Fowler" type flap (inboard section) – CELC
C21 Flap actuator – electrically actuated
C22 Flap actuator flexible drive shaft
C23 Flap (inboard section) inner track
C24 Flap drive unit (electrical) and flexible drive shaft
C25 Flap (outboard) outer carriage
C26 Aileron hinges – four off
C27 Rudder and elevator cable (lower) pulleys
C28 Rudder booster actuator
C29 Rudder and elevator control servos (autopilot) – electrically actuated
C30 Rudder control quadrant
C31 Vertical rudder control servo (autopilot) – electrically actuated
C32 Vertical rudder post and counter balance
C33 Single-piece one-spar post-mounted vertical rudder – "one shot" (CELC) with integral spar
C34 Rudder post
C35 Rudder trim tab actuator
C36 Rudder trim tab – single-piece CELC
C37 Single-piece two-spar hinge-mounted rudder – "one shot" (CELC) with integral spars
C38 Rudder hinges – three off
C39 Tailplane trimming (vertical) actuators – dual electro-mechanical
C40 Tailplane hinge
C41 Elevator control quadrant
C42 Single-piece two-spar hinge-mounted elevator – "one shot" (CELC) with integral spars
C43 Elevator hinges – three per surface
C44 Elevator mass balance and horn
C45 Single-piece hinge-mounted elevator tab – single-piece CELC
C46 Spoiler panels – single-piece CELC
E5 Instrument landing system antennas
E7 Marker beacon antenna
E8 GNIC 1 antenna
E9 Dual static ports (both sides) – electrically heated
E9 VHF COM 2 antenna
E16 Smart probe (both side) – electrically heated
E11 Electrically heated glass windscreen with water repellant coating
E12 Overhead panel with dome lighting, pilot's reading light and speakers
E13 TCAS antenna
E14 Ice indicator
E15 GPS 1 and 2
E16 Cabin lighting units – white LEDs
E17 Wing inspection light
E18 Landing/taxi light – four off
E19 Forward navigation lights – both sides
E20 Static discharge wicks
E26 Rear fuselage avionics bay – above main baggage bay
E21 Logo light (optional) – located on nylon side windows
E24 ELT antenna
E23 HF antenna
E34 VOR/LOC/GS antenna – both sides
E35 Yaw beacon

Fuel system

F1 Main fuel tank – 3,014 litres
F2 Fuel vent tank
F3 Gravity filler ports – one per wing
F4 Fuel probe – four per wing
F5 Fuel vent line
F6 Refuel line
F7 Single point refuelling (SPR) connector – located on starboard side but shown on port side for clarity
F8 SPR panel
F9 Fuel boost pump and ejector pump – one each per wing
F10 Fuel cell access panels
F11 Fuel collector tank
F12 Fuel shut-off valve
F13 Fuel feed line to engine
F14 Cross-feed valve
F15 High level sensor

Powerplant

P1 Pratt & Whitney Canada PW535E high bypass turbofan engine rated at 5,265lb thrust (14.2kN)
P2 Exciter box
P3 Starter generator
P4 Engine accessory gearbox
P5 Oil filler
P6 Engine (forward) mounting yoke
P7 Engine pylon firewall
P8 Engine rear mount
P9 Engine fire extinguisher bottle – single shot
P10 Full authority digital engine control (FADEC) unit – both sides

Undercarriage and hydraulics

Two engine driven pressure compensated pumps supply the landing gear, brakes, multifunction spoilers, rudder stops and stick pushers – 3000psi (3,000lbf/in²)

U1 Nose landing gear (NLG) bay
U2 Steering unit
U3 NLG doors (two) – composite construction
U4 Retraction actuator
U5 Down lock
U6 Door mechanism
U7 Drag strut
U8 Forward retracting hydraulically actuated and mechanically steered nose landing gear (NLG)
U9 Shimmy damper
U10 Inboard retracting hydraulically actuated oleo pneumatic, trailing arm main landing gear (MLG) with multiple disc carbon brakes
U11 MLG doors (starboard only) – composite construction
U12 MLG shock strut
U13 Retraction actuator
U14 MLG bay

Instrument panel

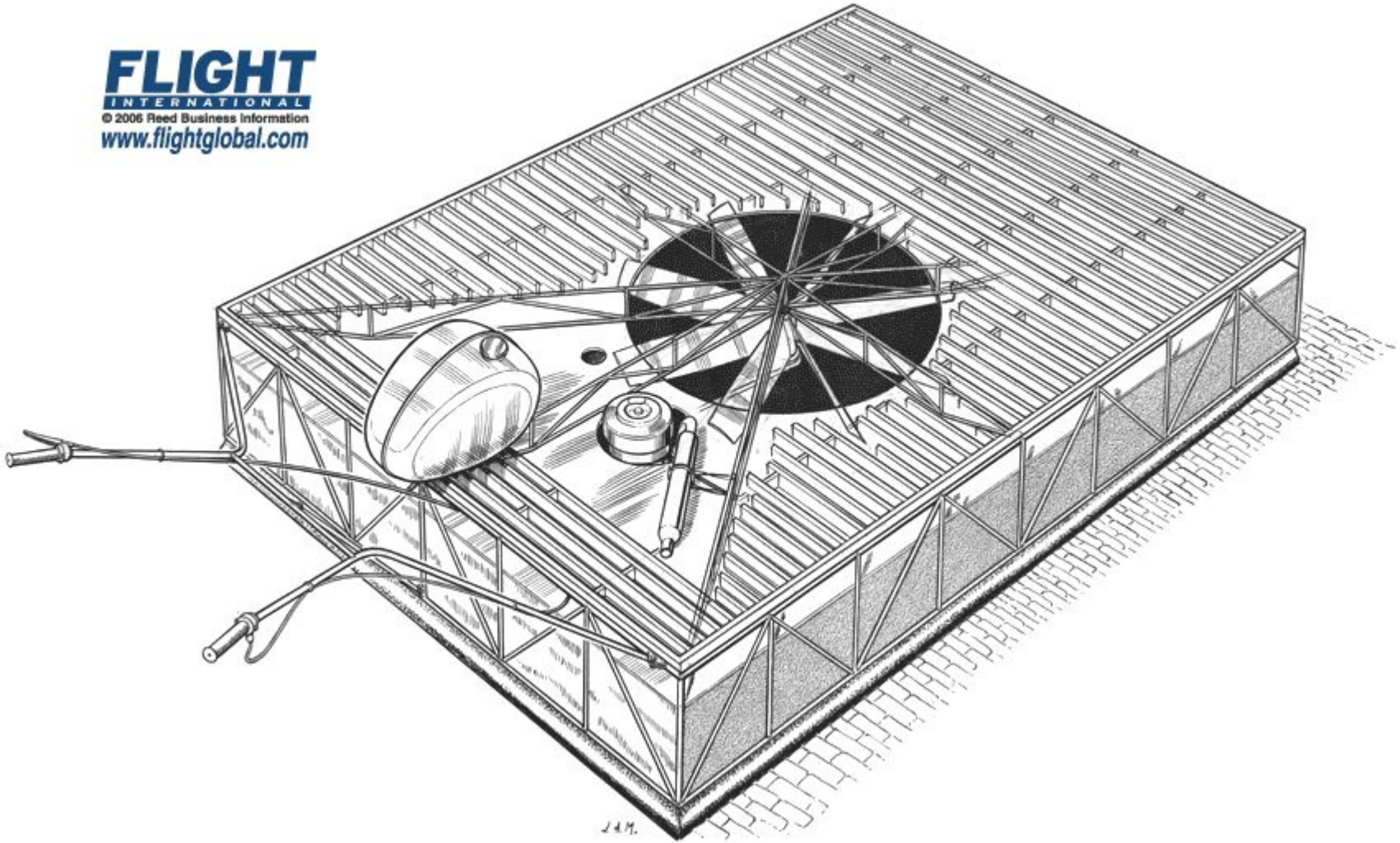
A Audio jack panel
B Cockpit voice recorder/logic light and HF radio panel
C Oxygen panel
D Emergency oxygen masks stowage – both sides
E Electrical panel
F Fuel pumps/passenger services/stall and hydraulic pump panel
G Audio control panels
H Active matrix liquid crystal display (three off) providing primary flight displays, flight management system, navigation, situational and avoidance systems – Prodigy system/Garmin
J Light panel
K Magnetic compass
L Integrated electronic standby instrument system
M Guidance panel
N Control yoke with trim controls
O Ice protection and heating panel
P Landing gear lever
Q Flight management system panel
R Powerchek/ECS panel
S Tail panel
T Engine fire and trim panel
U Throttle, flaps, parking brake and rate-of-configuration panel
V Fresh-air vent
W Pneumatic control panel
X Microphone connection

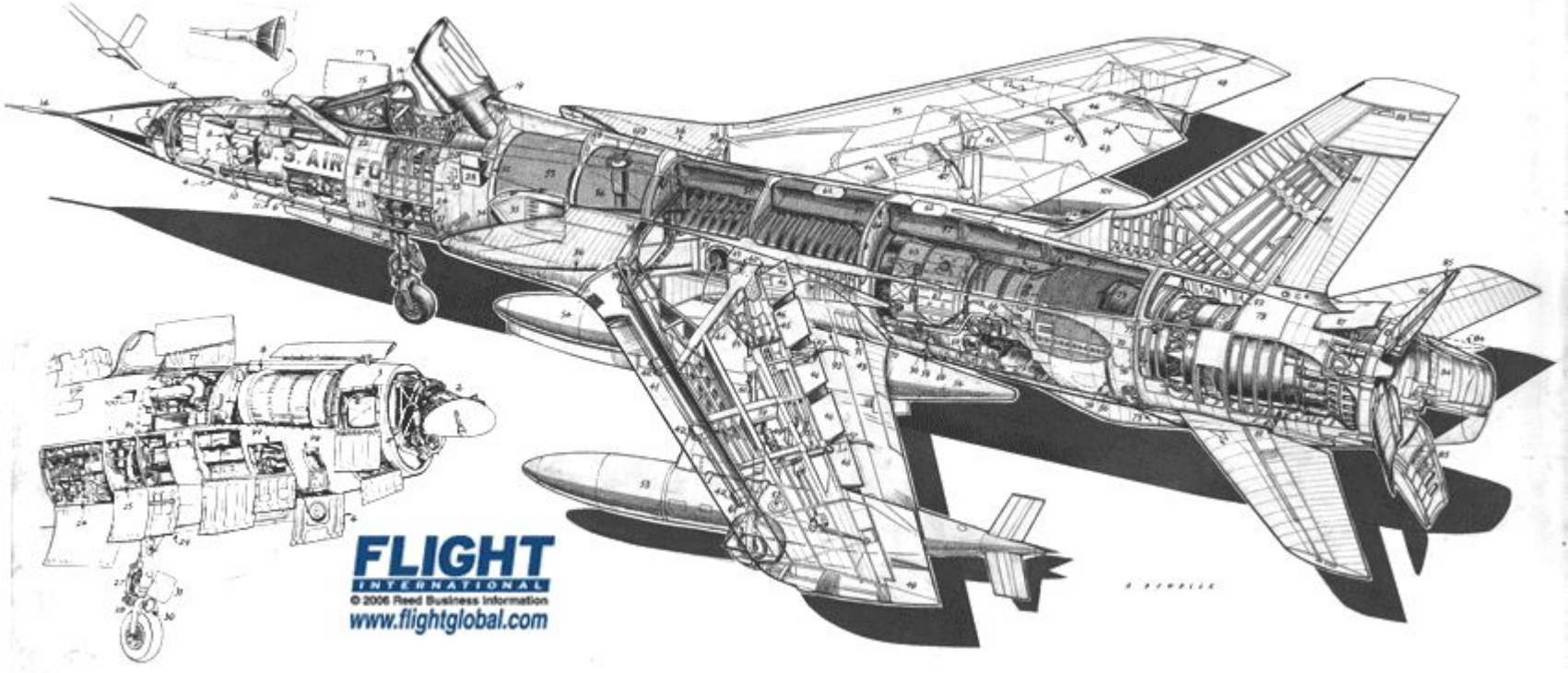
Avionics and electrical

E1 Garmin GWX-68 weather avoidance radar
E2 Emergency power distribution unit
E3 Battery No 1 – 24v DC lead-acid
E4 Main avionics rack – located behind instrument panel
E5 Instrument panel with (three) full colour flight displays
E21 Ground power receptacle – battery No 2 located in starboard fairing
E22 Cabin (rear) avionics bay
E23 Transponder antenna
E24 Rear navigation lights – both sides
E25 Iridium antenna
E26 VHF COM 1 antenna
E27 Wi-Fi antenna
E28 Anti-collision light
E29 Power distribution unit – both sides

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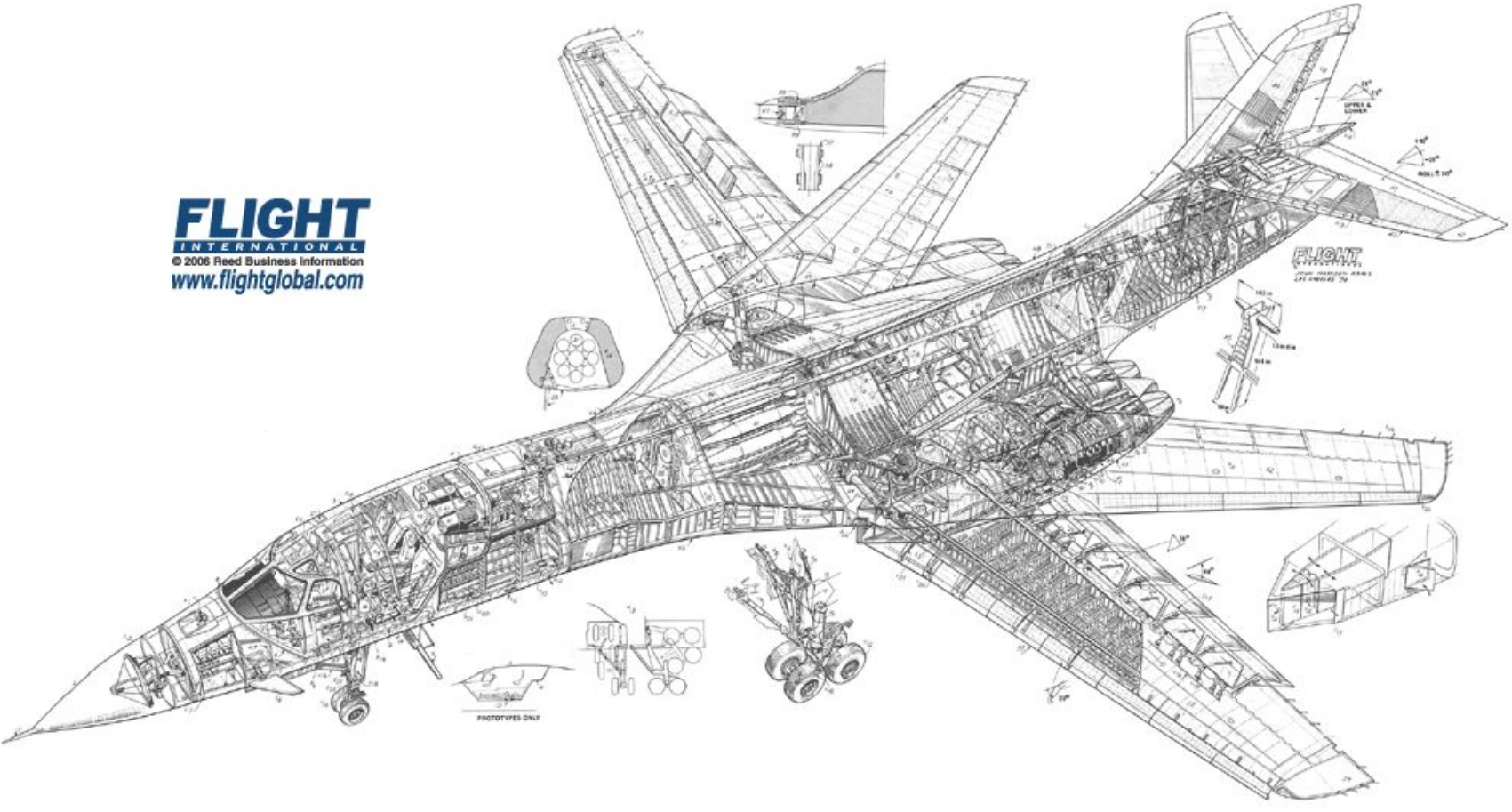
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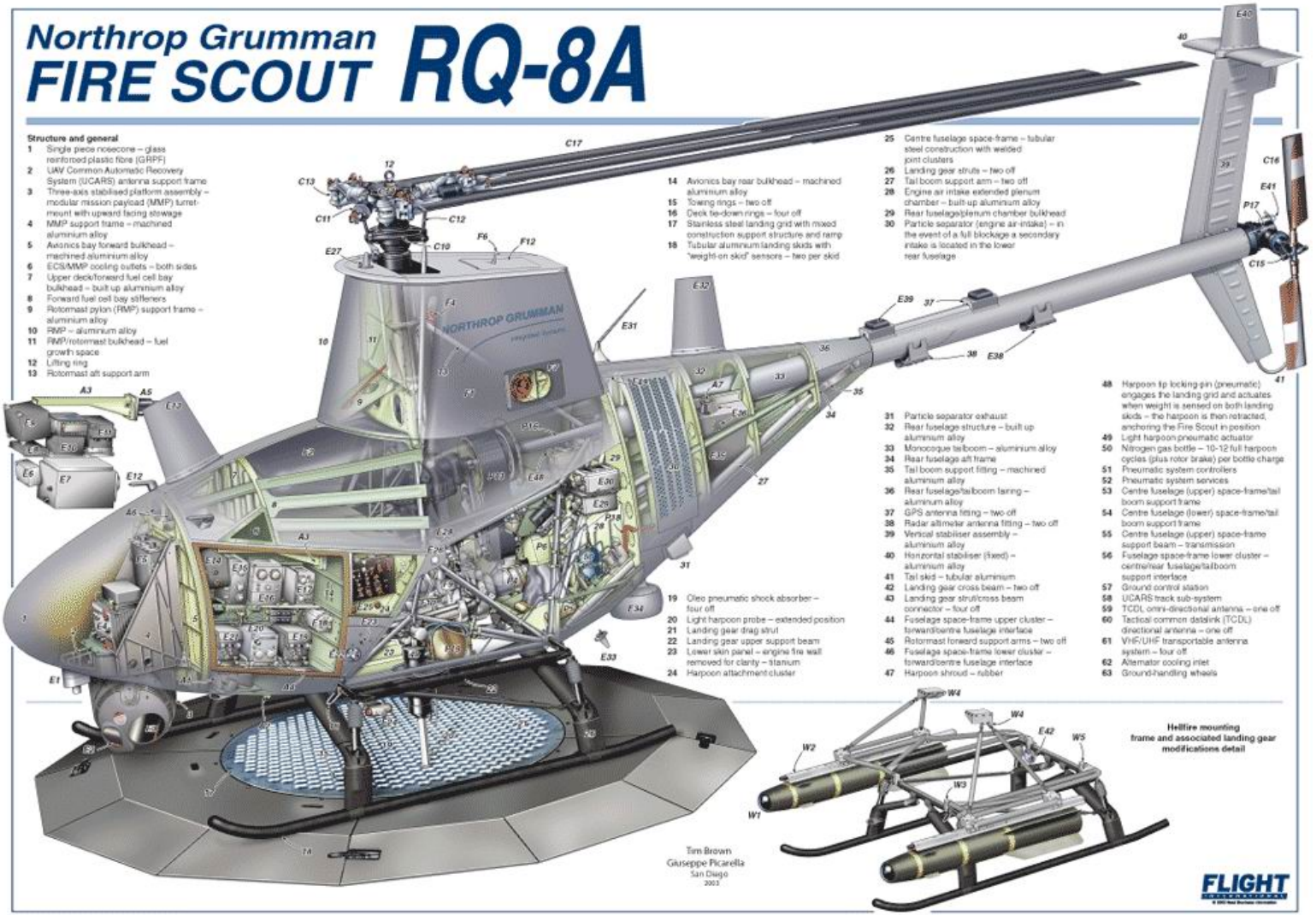


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Northrop Grumman FIRE SCOUT RQ-8A



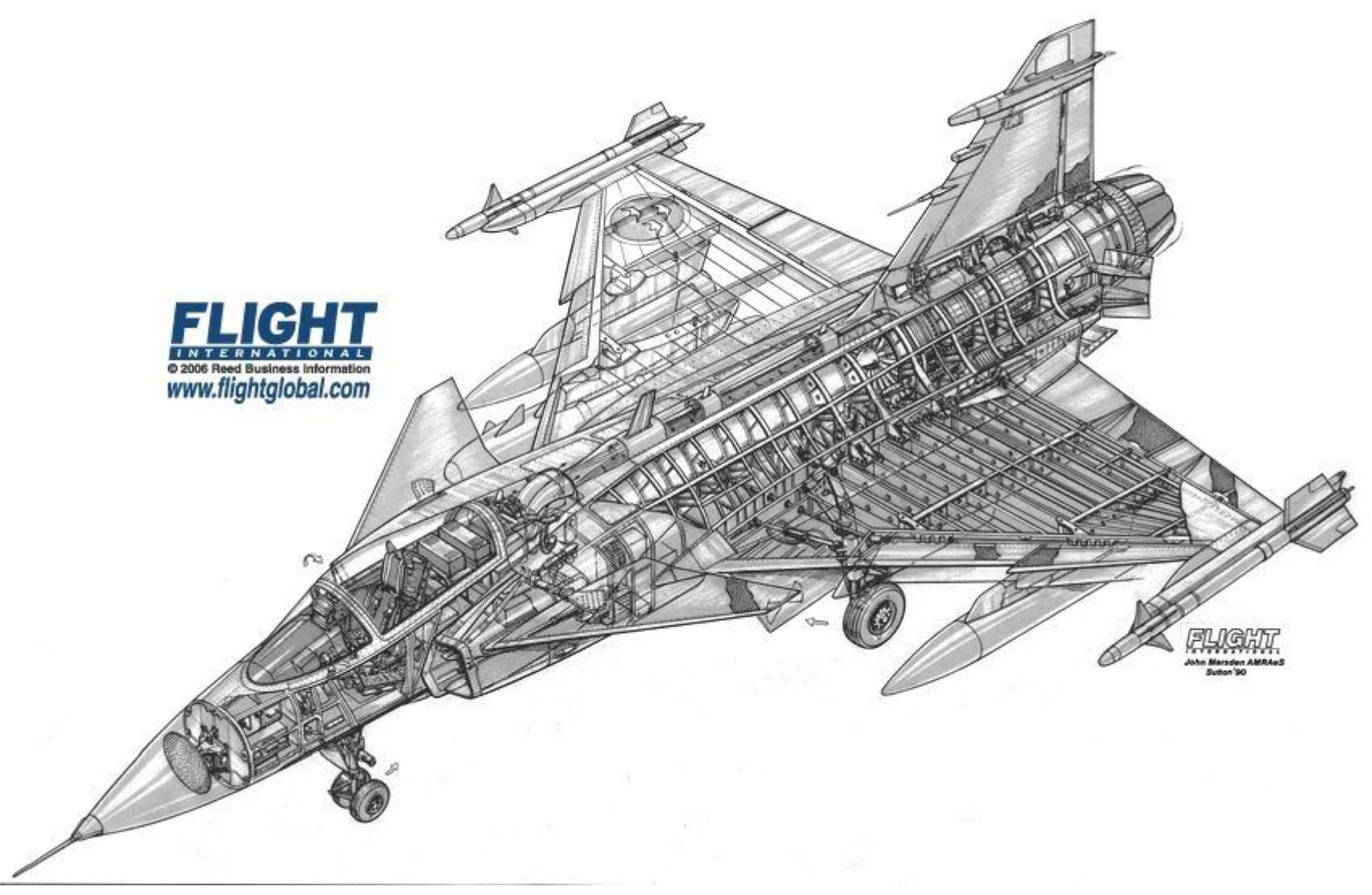
Structure and general

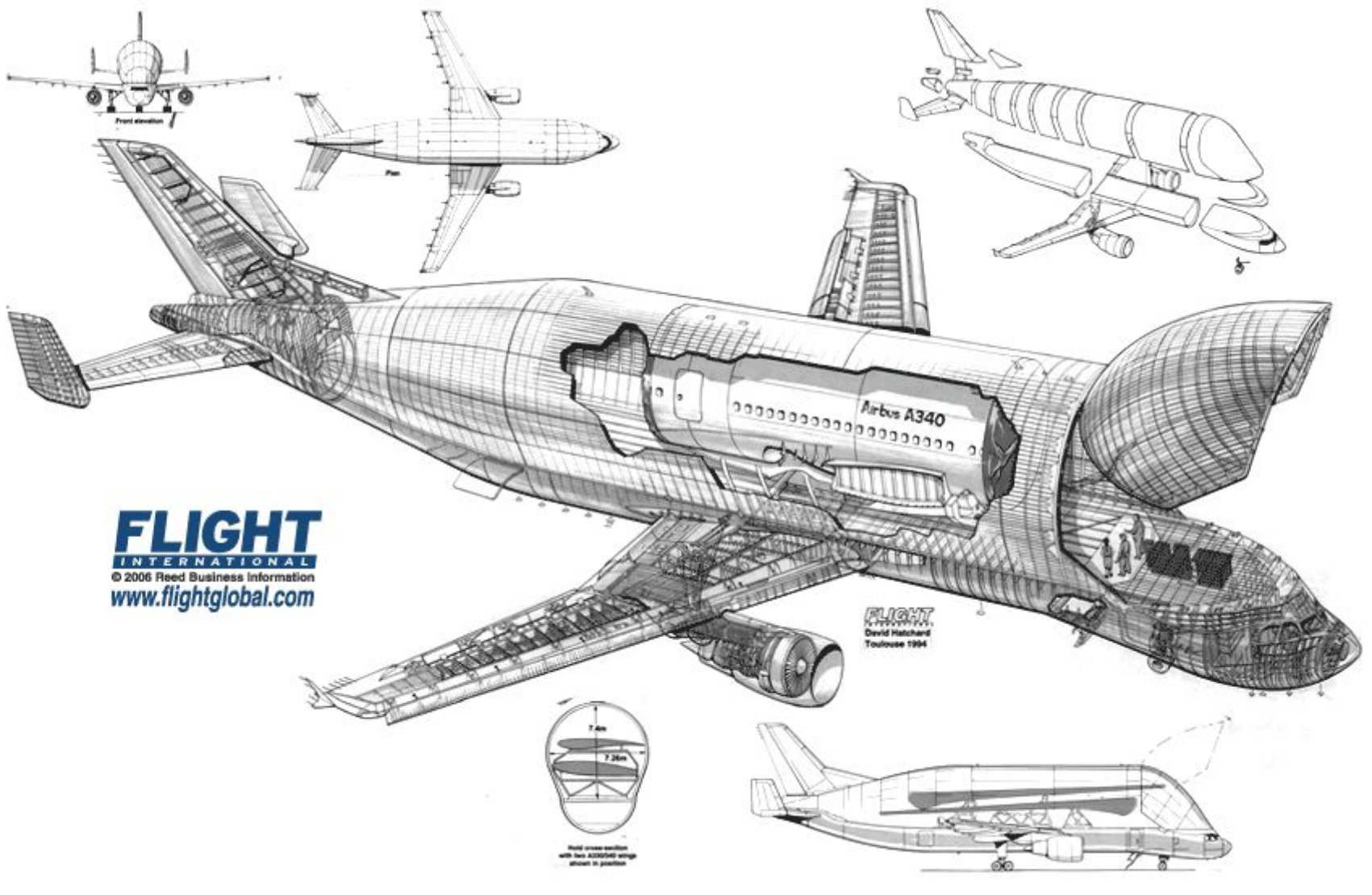
1 Single piece nosecone – glass reinforced plastic fibre (GRPF)
2 UAV Common Automatic Recovery System (UCARS) antenna support frame
3 Three-axis stabilised platform assembly – modular mission payload (MMP) turret-mount with upward facing stowage
4 MMP support frame – machined aluminium alloy
5 Avionics bay forward bulkhead – machined aluminium alloy
6 ECS/MMP cooling outlets – both sides
7 Upper deck/forward fuel cell bay bulkhead – built up aluminium alloy
8 Forward fuel cell bay stiffeners
9 Rotormast pylon (RMP) support frame – aluminium alloy
10 RMP – aluminium alloy
11 RMP/rotormast bulkhead – fuel growth space
12 Lifting ring
13 Rotormast aft support arm
14 Avionics bay rear bulkhead – machined aluminium alloy
15 Towing rings – two off
16 Deck tie-down rings – four off
17 Stainless steel landing grid with mixed construction support structure and ramp
18 Tubular aluminium landing skids with "weight-on skid" sensors – two per skid
19 Oleo pneumatic shock absorber – four off
20 Light harpoon probe – extended position
21 Landing gear drag strut
22 Landing gear upper support beam
23 Lower skin panel – engine fire wall removed for clarity – titanium
24 Harpoon attachment cluster
25 Centre fuselage space-frame – tubular steel construction with welded joint clusters
26 Landing gear struts – two off
27 Tail boom support arm – two off
28 Engine air intake extended plenum chamber – built up aluminium alloy
29 Rear fuselage/plenum chamber bulkhead
30 Particle separator (engine air-intake) – in the event of a full blockage a secondary intake is located in the lower rear fuselage
31 Particle separator exhaust
32 Rear fuselage structure – built up aluminium alloy
33 Monocoque tailboom – aluminium alloy
34 Rear fuselage aft frame
35 Tail boom support fitting – machined aluminium alloy
36 Rear fuselage/tailboom fairing – aluminium alloy
37 GPS antenna fitting – two off
38 Radar altimeter antenna fitting – two off
39 Vertical stabiliser assembly – aluminium alloy
40 Horizontal stabiliser (fixed) – aluminium alloy
41 Tail skid – tubular aluminium
42 Landing gear cross beam – two off
43 Landing gear strut/cross beam connector – four off
44 Fuselage space-frame upper cluster – forward/centre fuselage interface
45 Rotormast forward support arms – two off
46 Fuselage space-frame lower cluster – forward/centre fuselage interface
47 Harpoon shroud – rubber
48 Harpoon tip locking pin (pneumatic) engages the landing grid and actuates when weight is sensed on both landing skids – the harpoon is then retracted, anchoring the Fire Scout in position
49 Light harpoon pneumatic actuator
50 Nitrogen gas bottle – 10-12 full harpoon cycles (plus rotor brake) per bottle charge
51 Pneumatic system controllers
52 Pneumatic system services
53 Centre fuselage (upper) space-frame/tail boom support frame
54 Centre fuselage (lower) space-frame/tail boom support frame
55 Centre fuselage (upper) space-frame support beam – transmission
56 Fuselage space-frame lower cluster – centre/rear fuselage/tailboom support interface
57 Ground control station
58 UCARS track sub-system
59 TCDL omni-directional antenna – one off
60 Tactical common datalink (TCDL) directional antenna – one off
61 VHF/UHF transportable antenna system – four off
62 Alternator cooling inlet
63 Ground-handling wheels

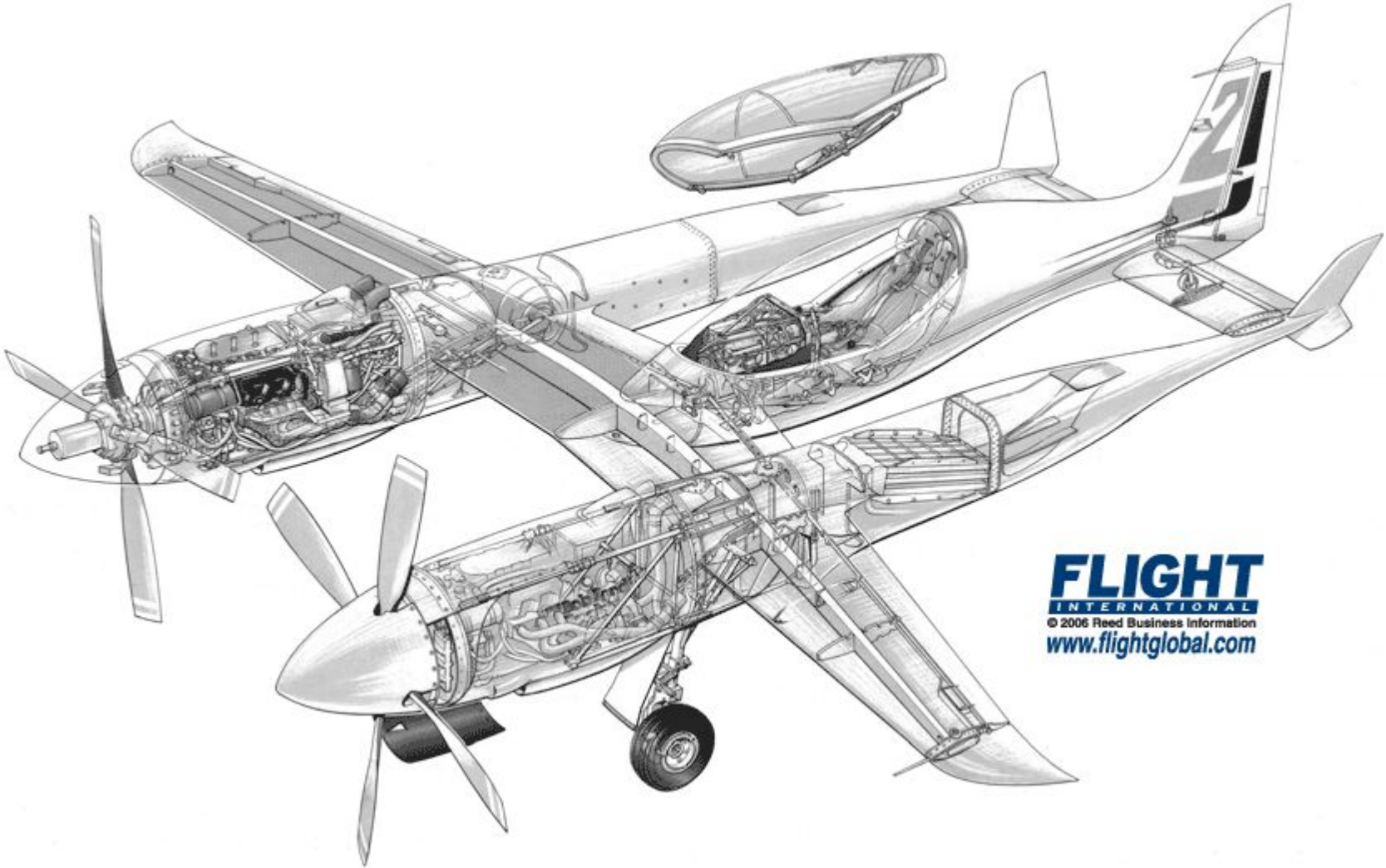
Hellfire mounting frame and associated landing gear modifications detail

Tim Brown
Giuseppe Picarella
San Diego
2003

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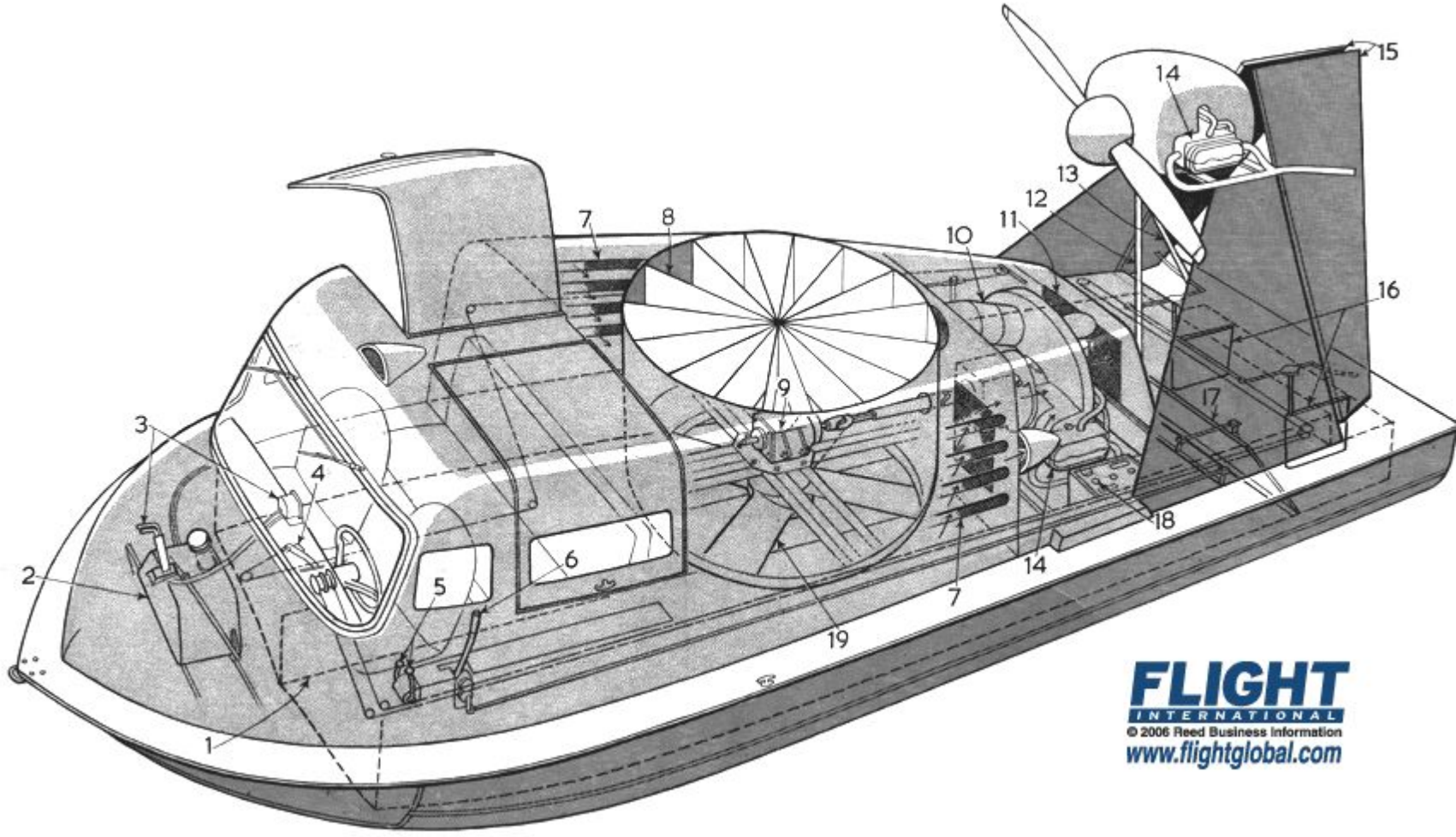

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John Marsden AMRAeS
Sutton '90


Airbus A340
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FLIGHT
David Hatchard
Toulouse 1994

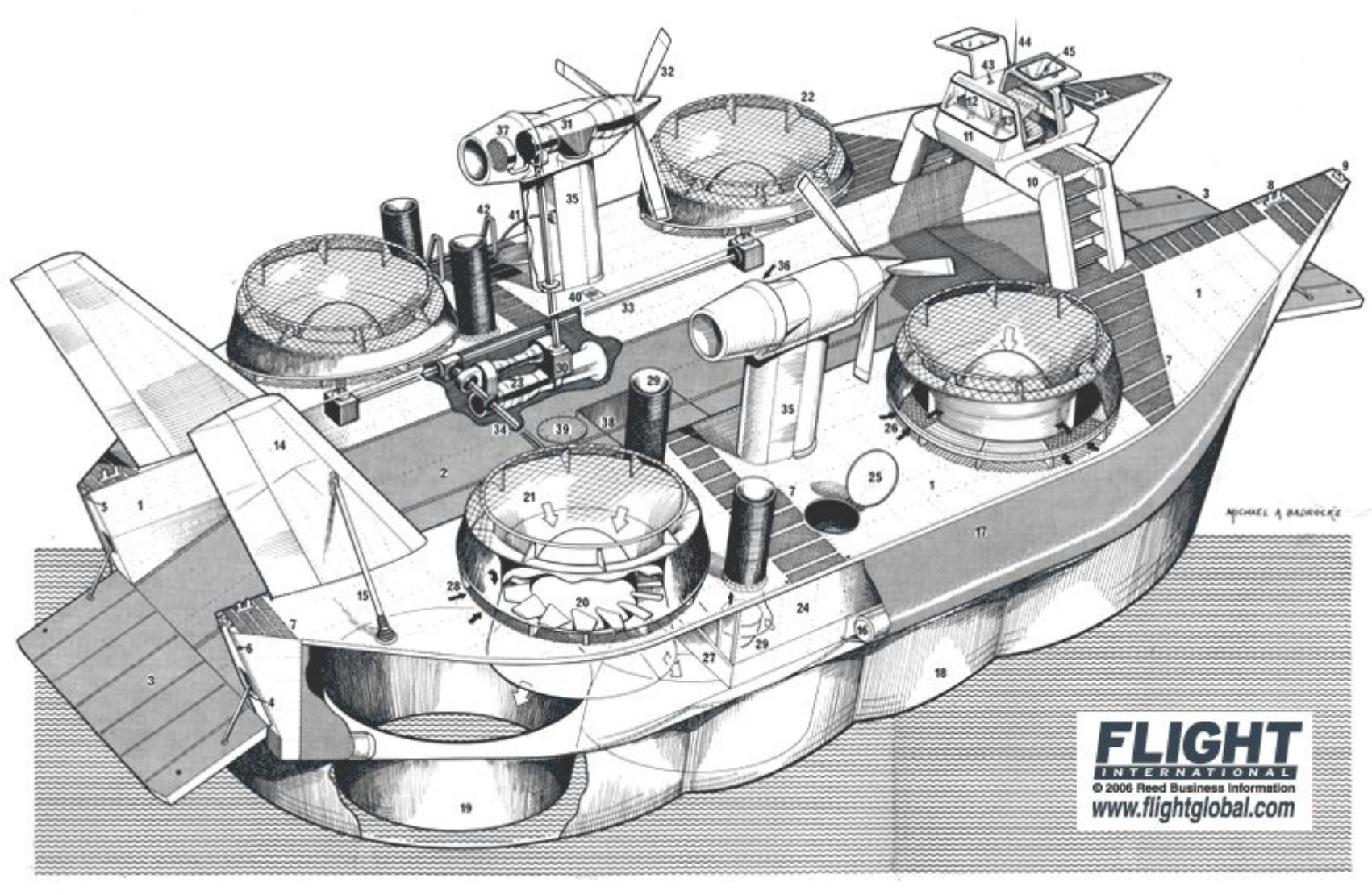


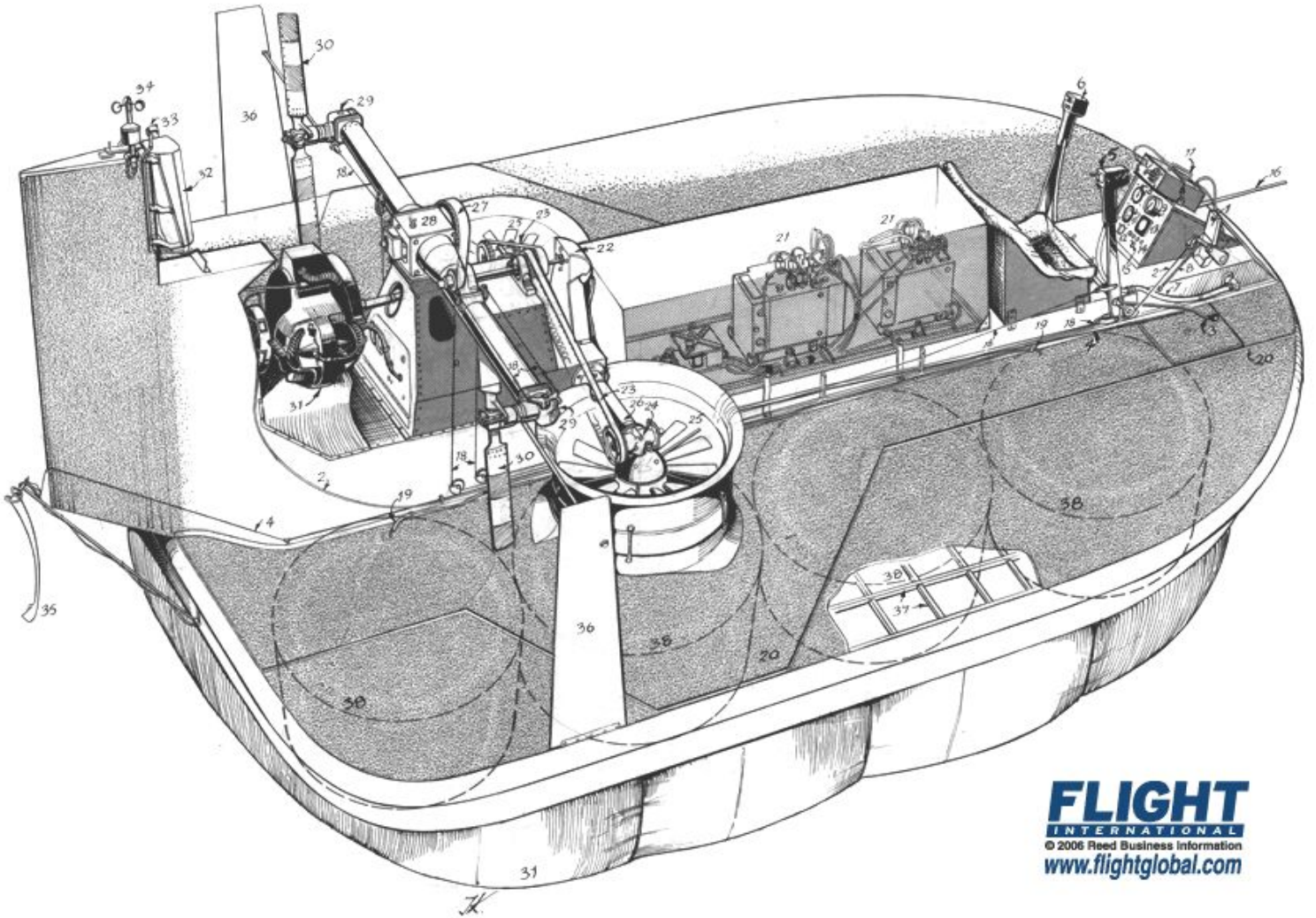
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Peter Wills



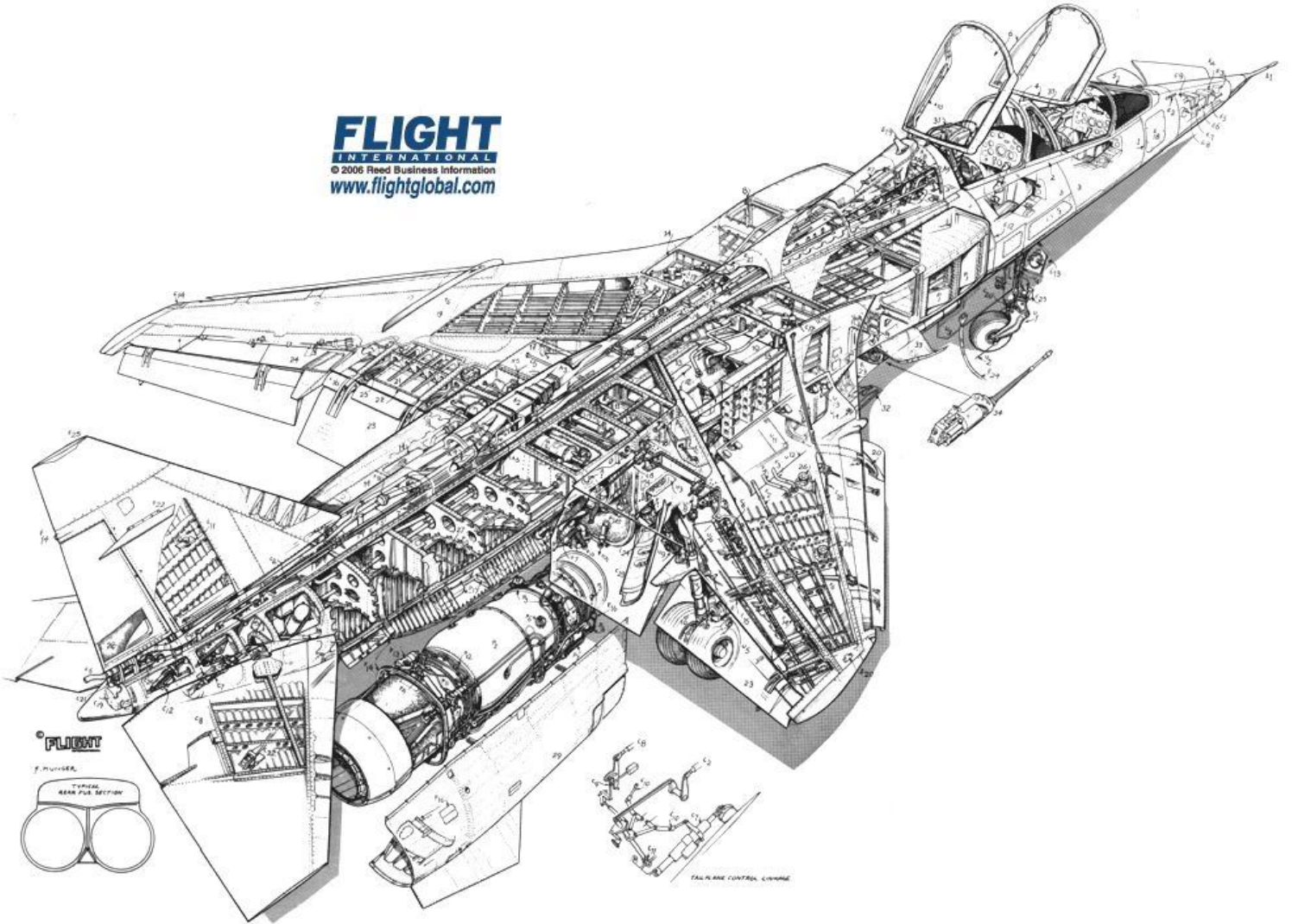
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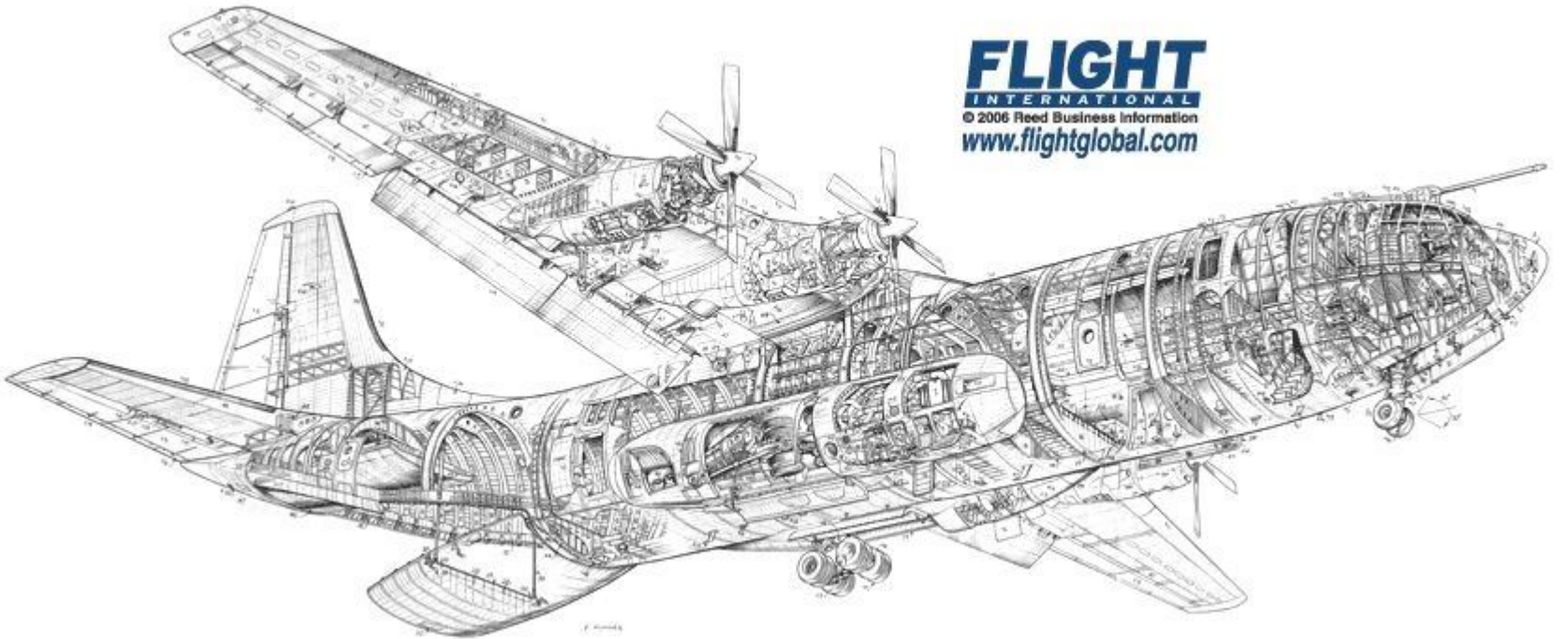

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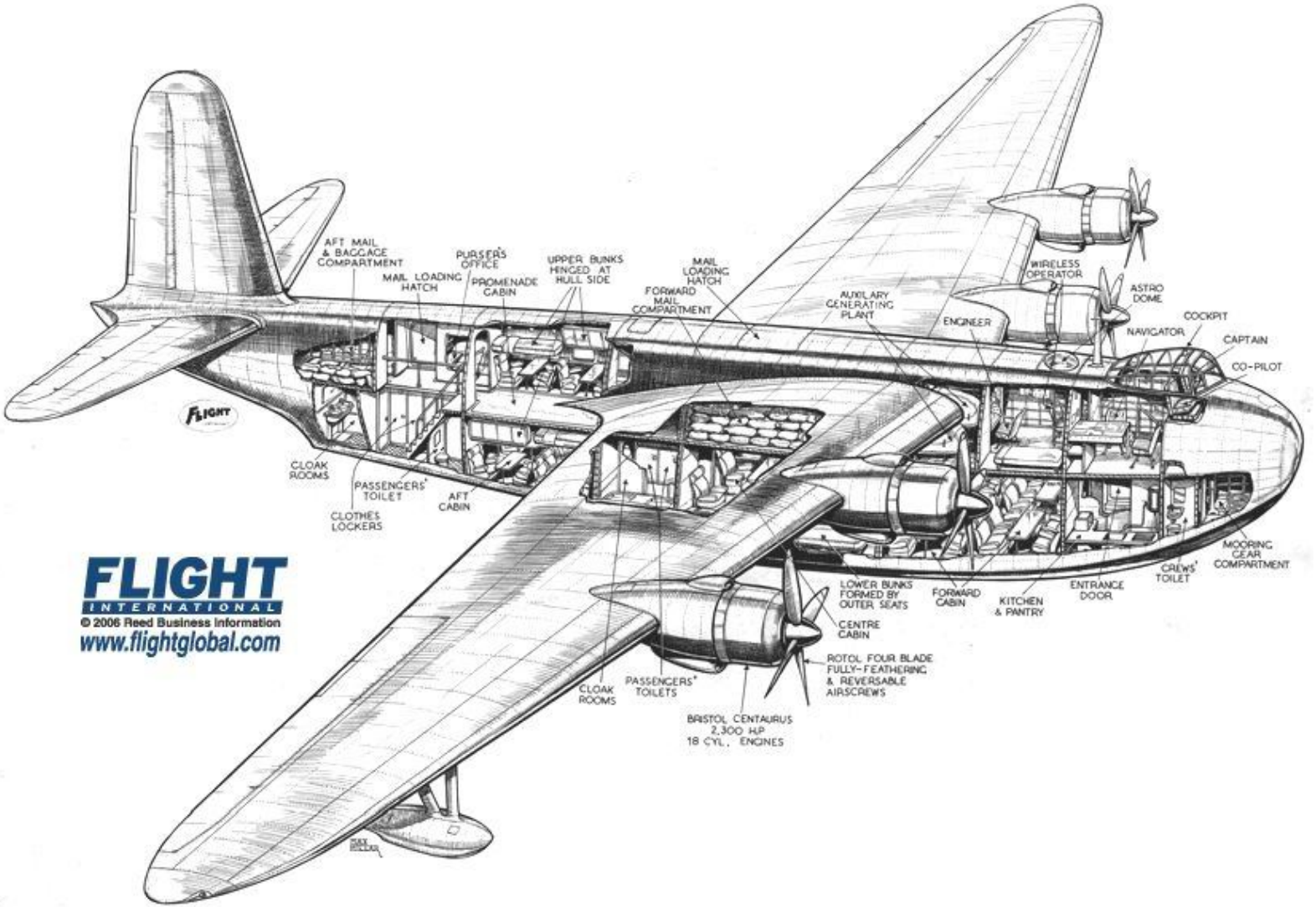
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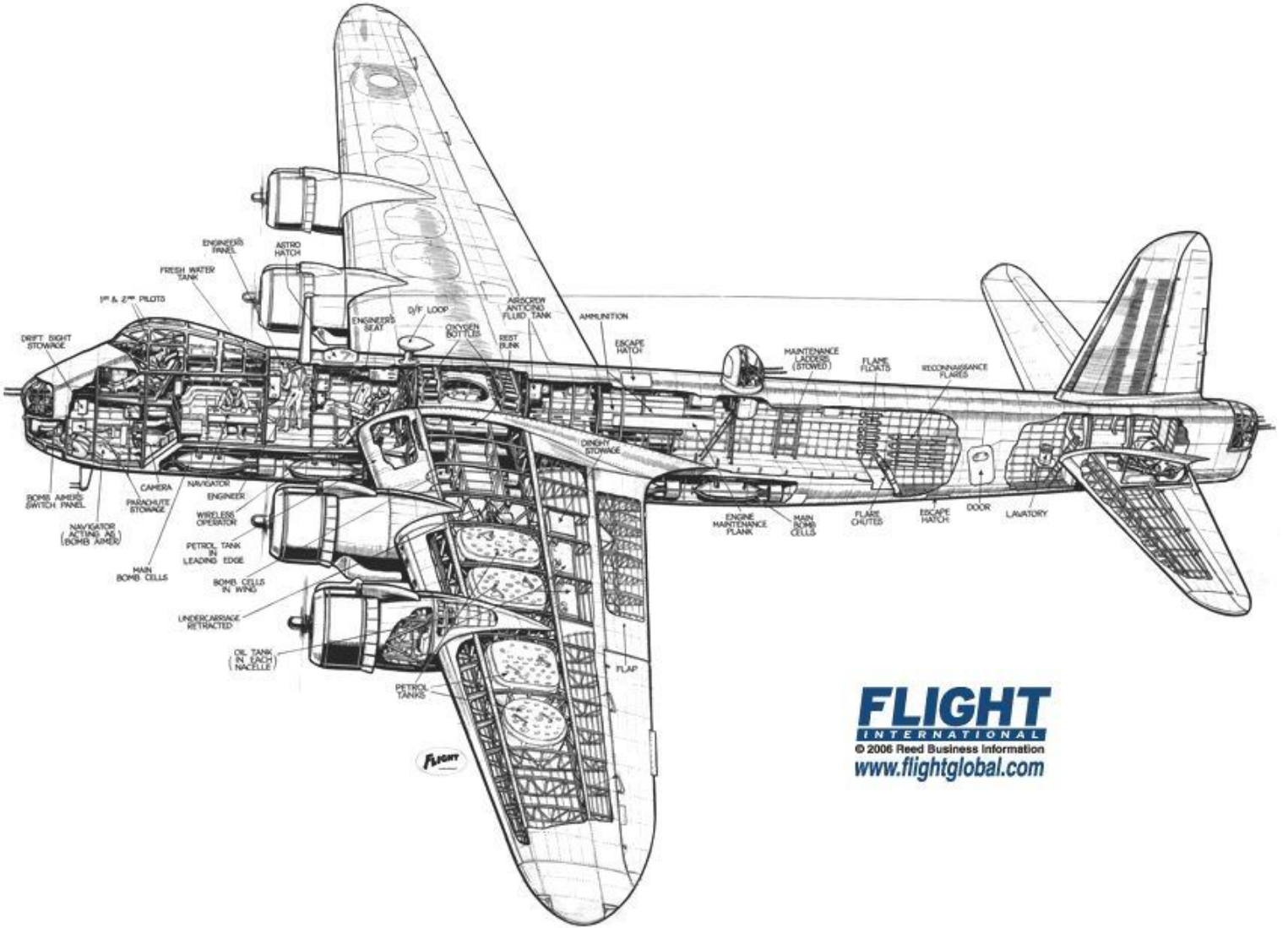




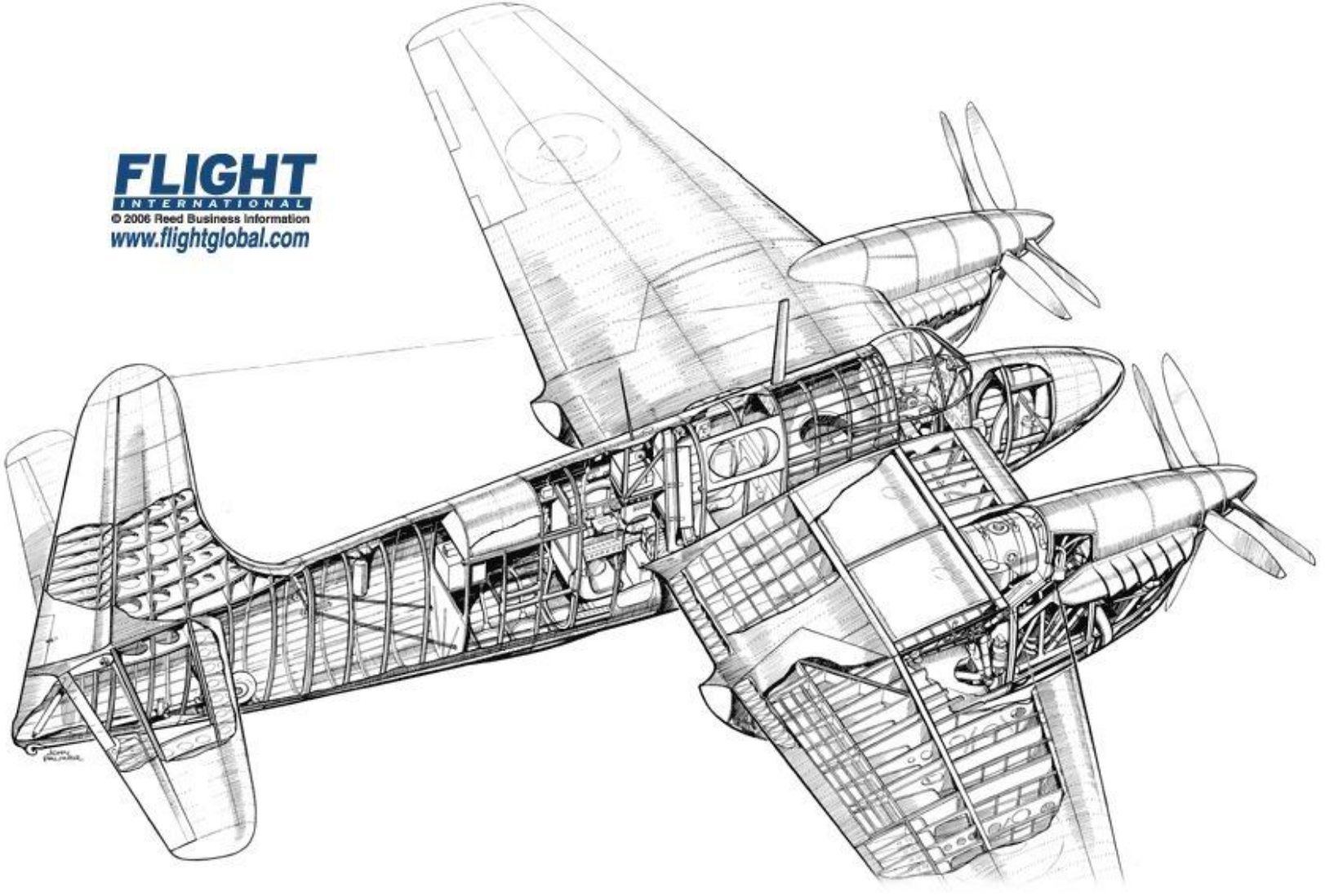
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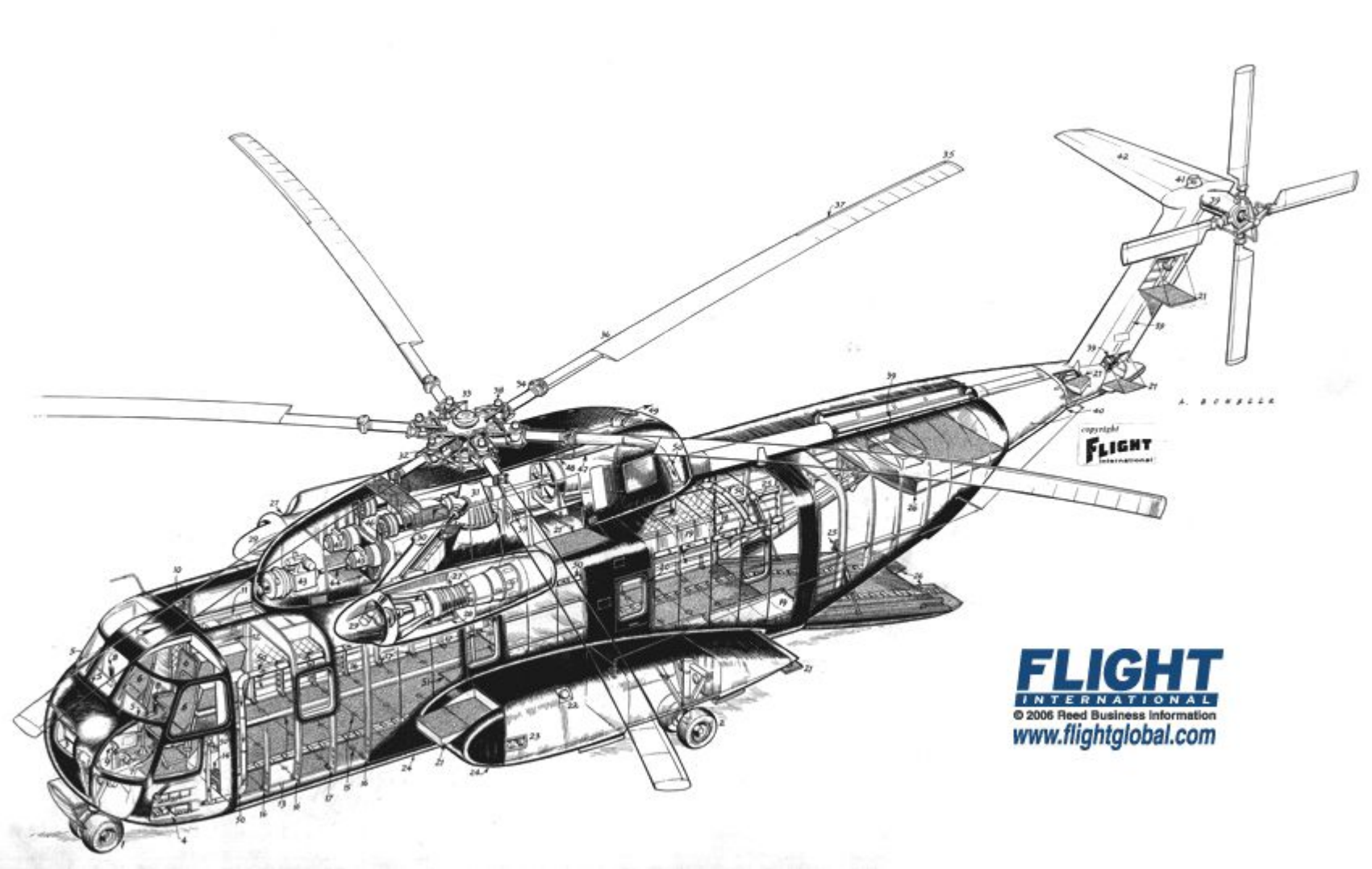


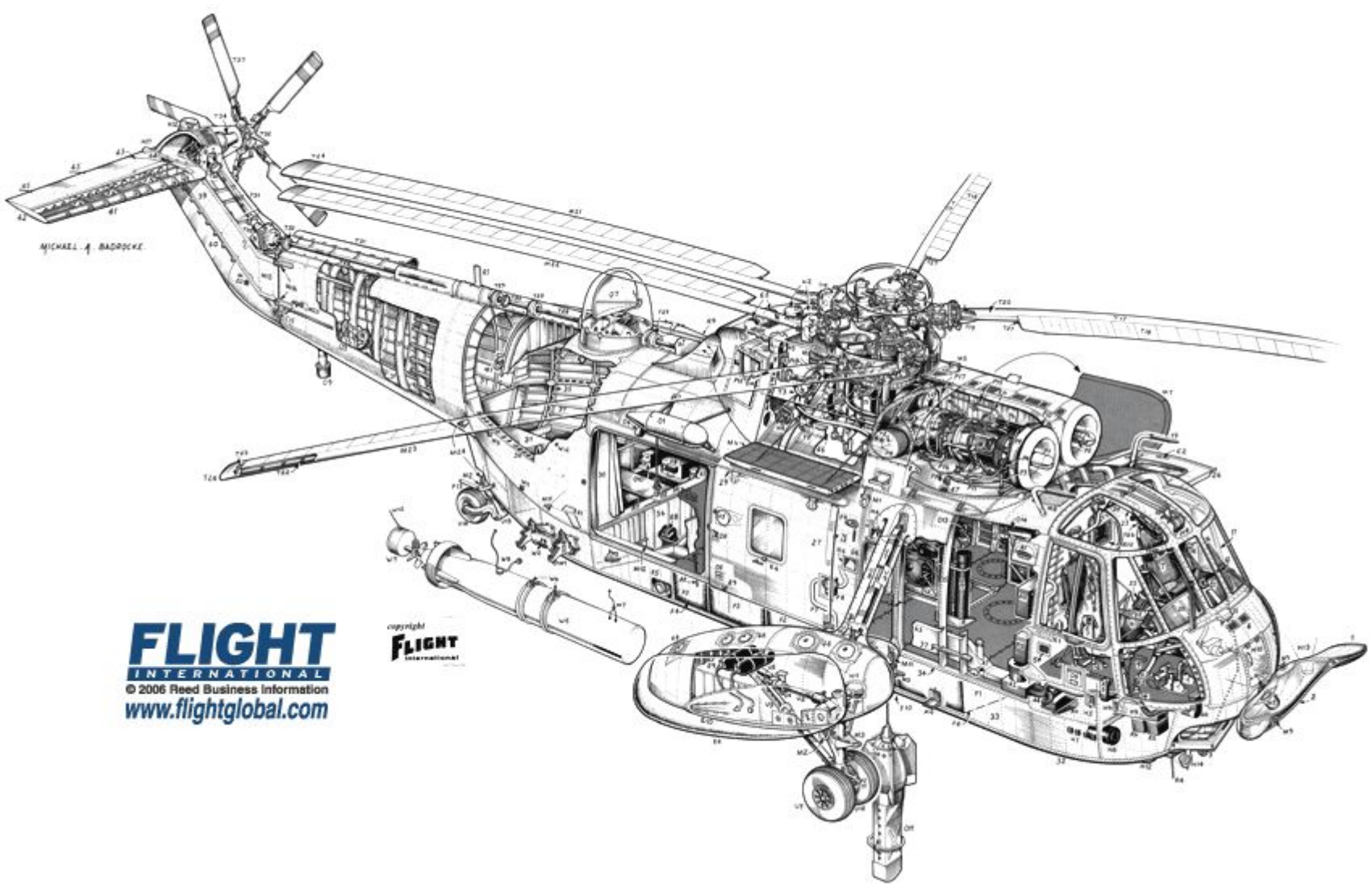
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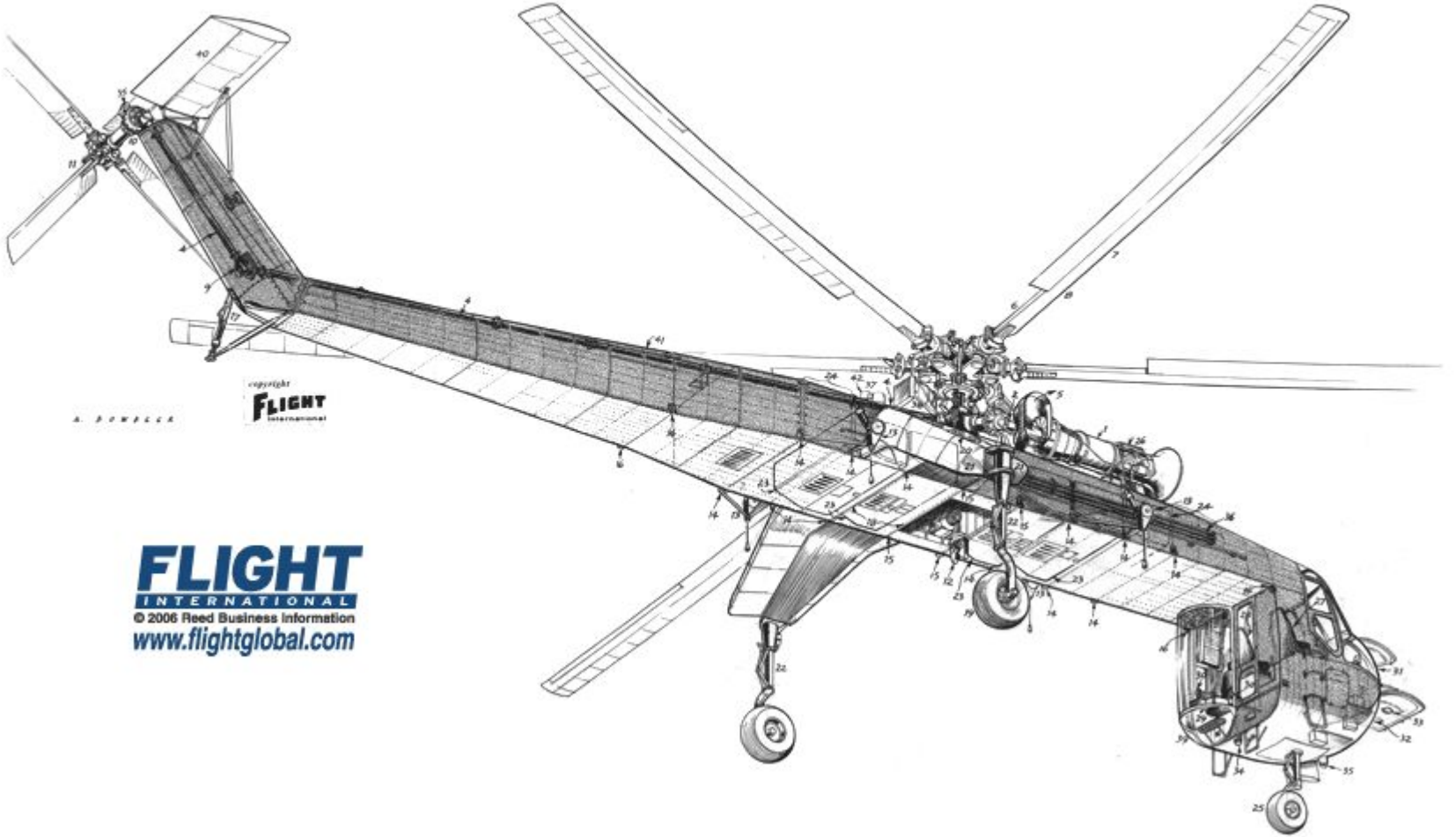


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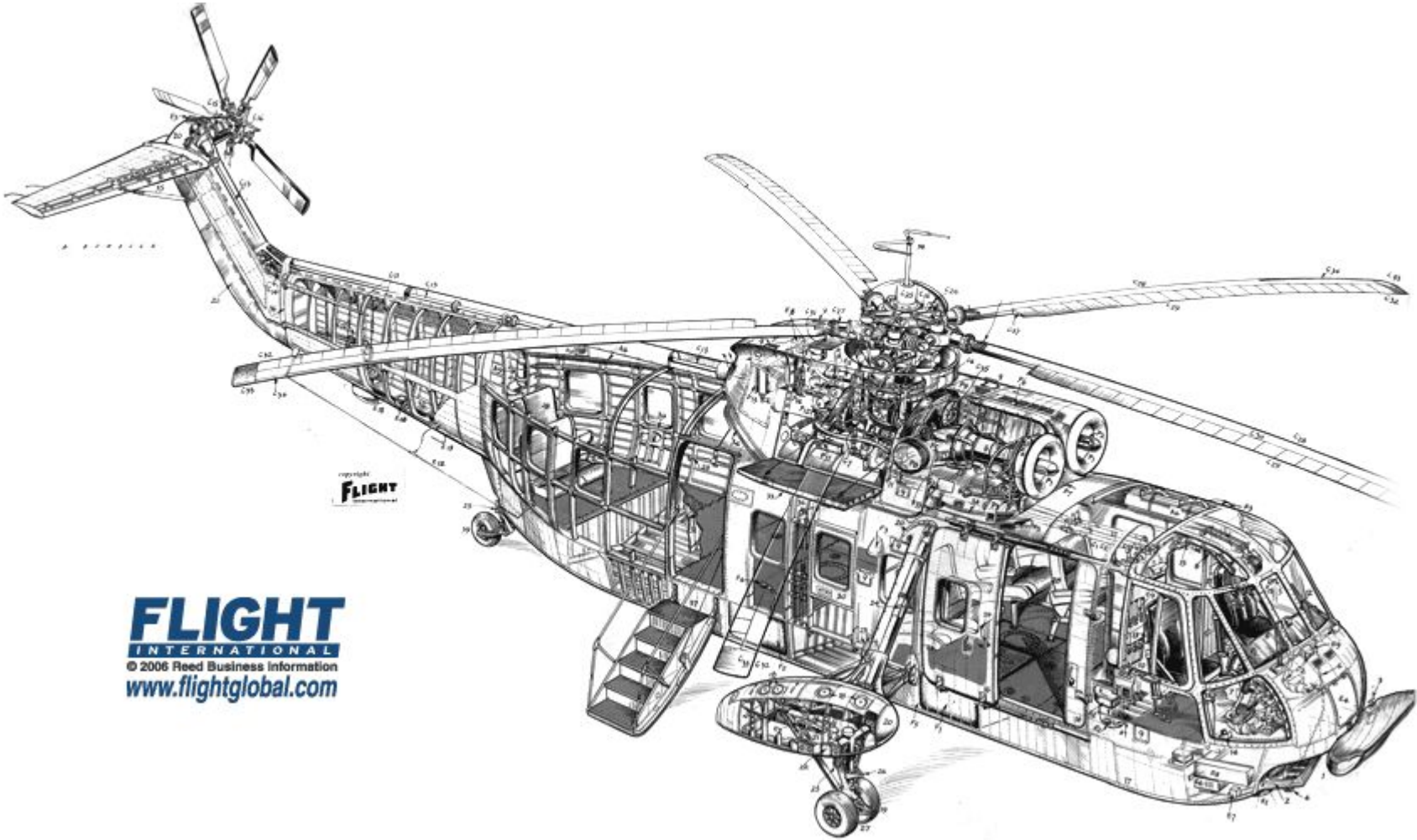

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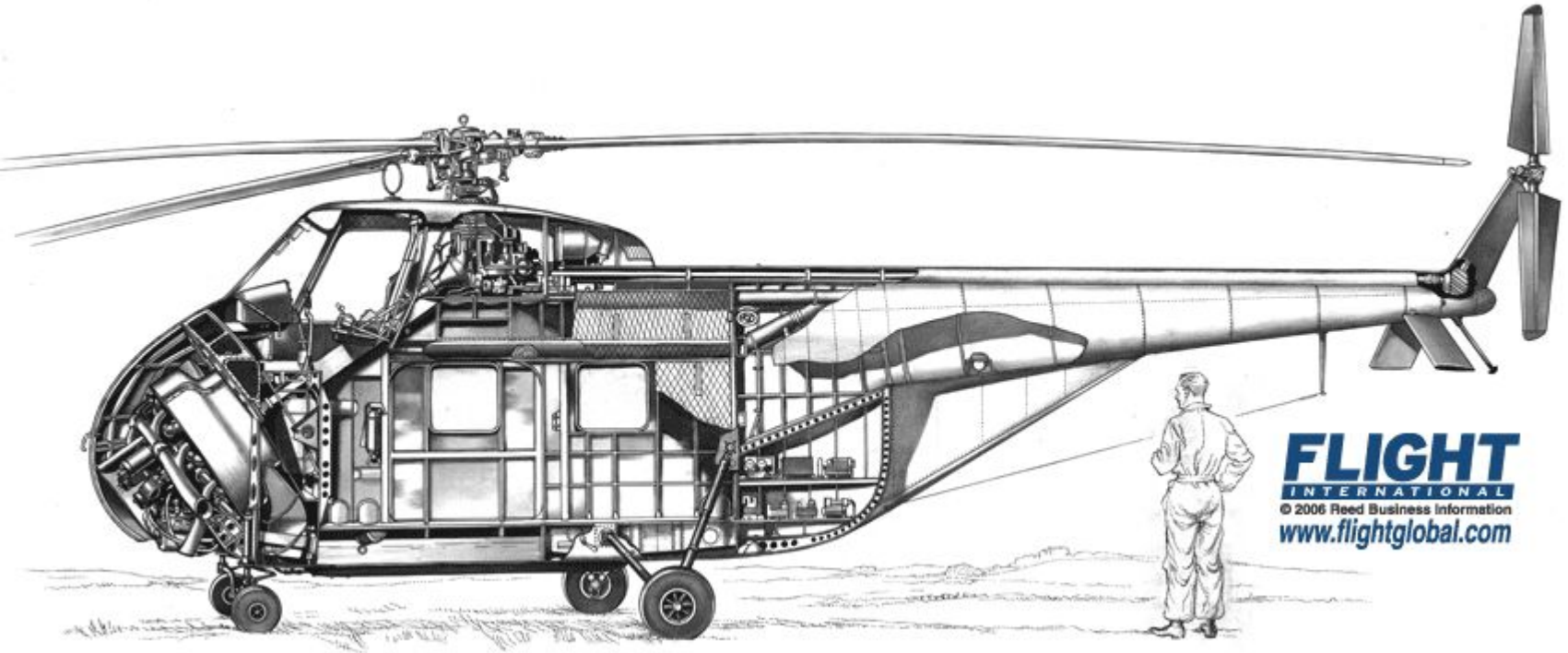
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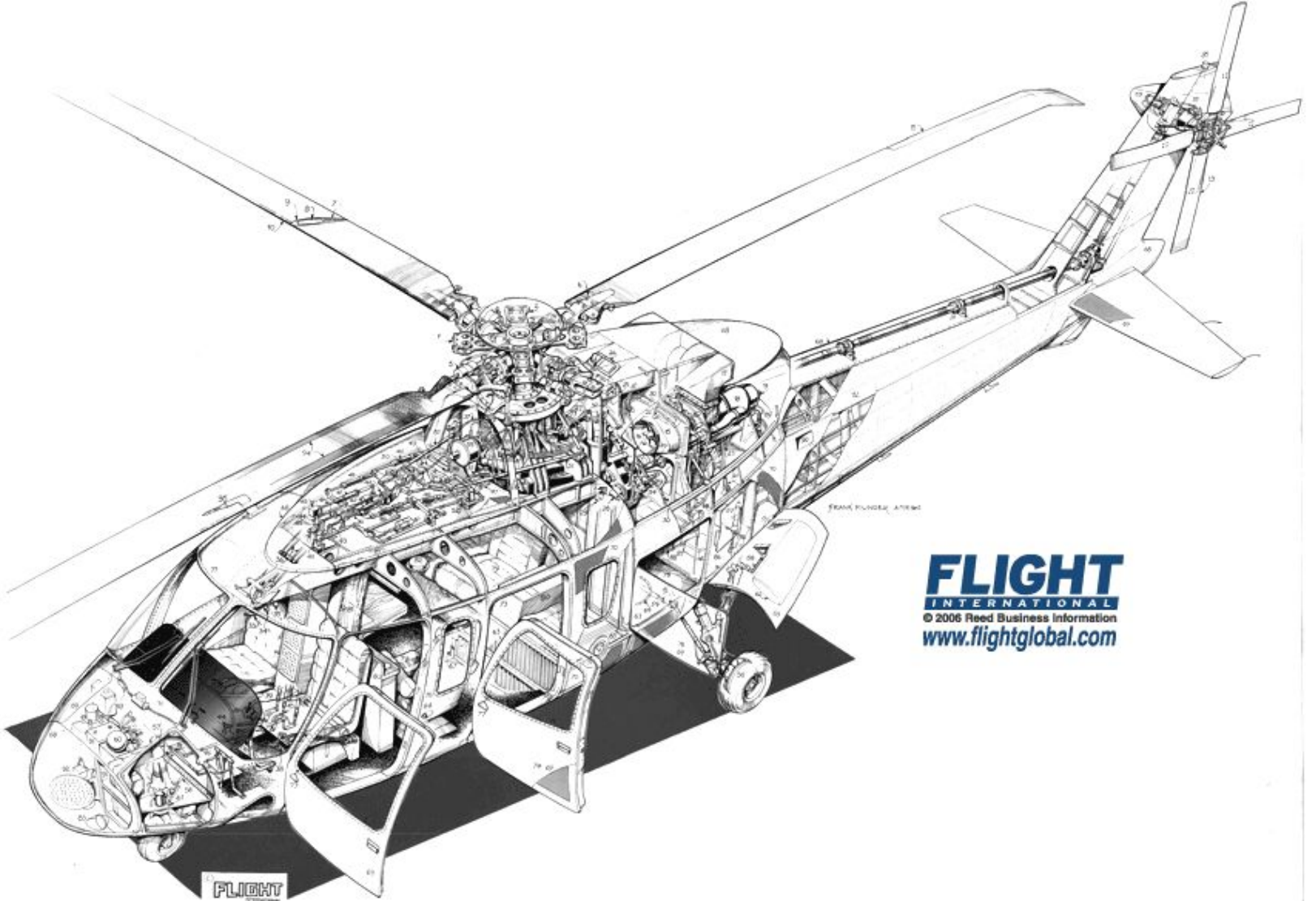
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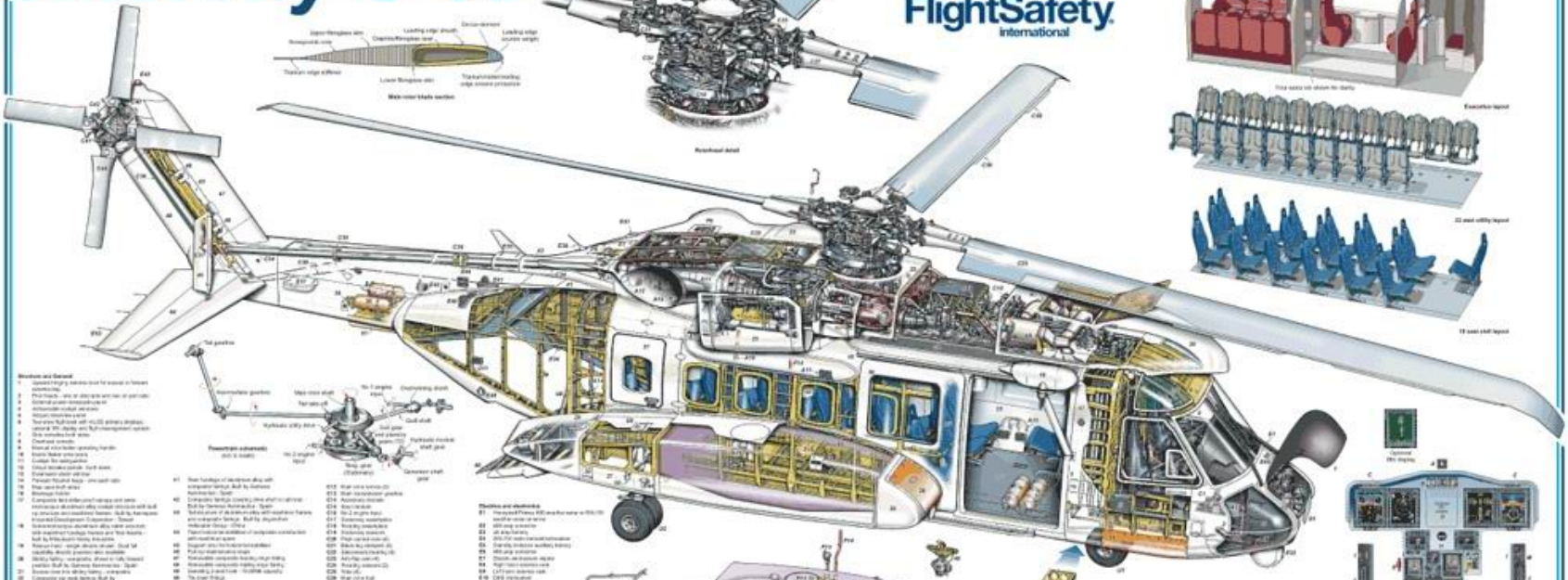
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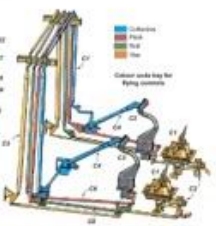
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Sikorsky S-92

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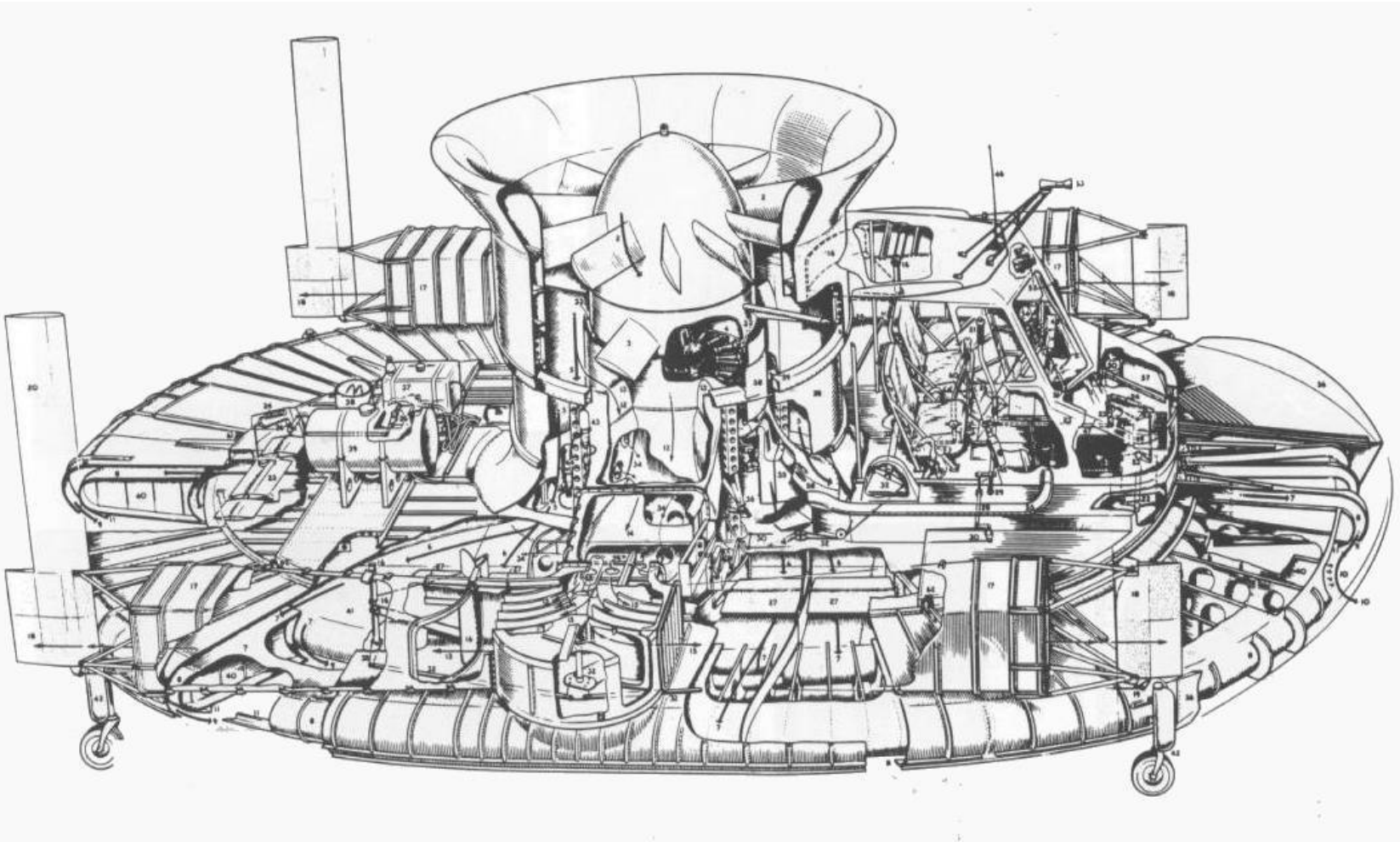






Tim Hall AMRAeS
Stratford, Connecticut
2001

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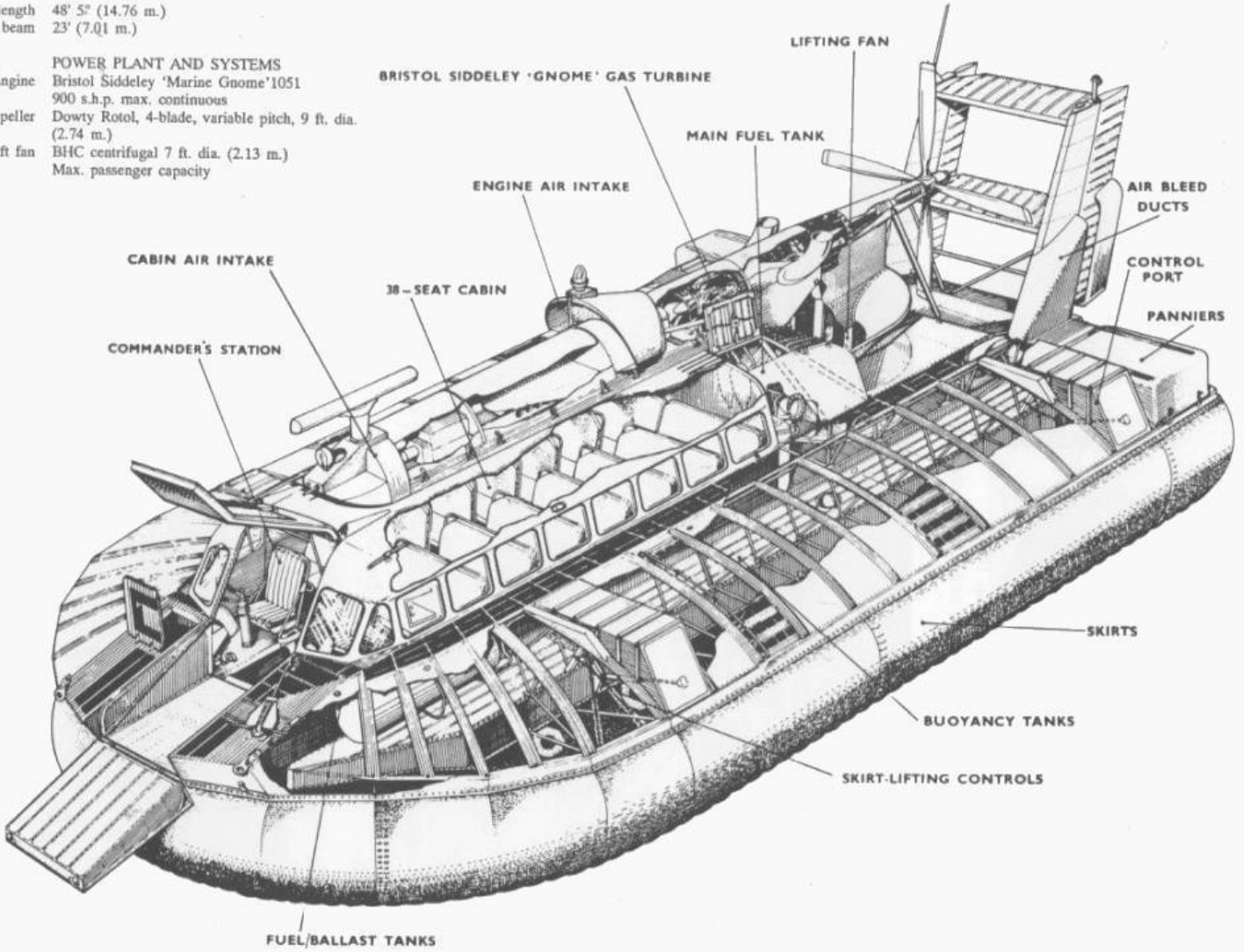


DIMENSIONS

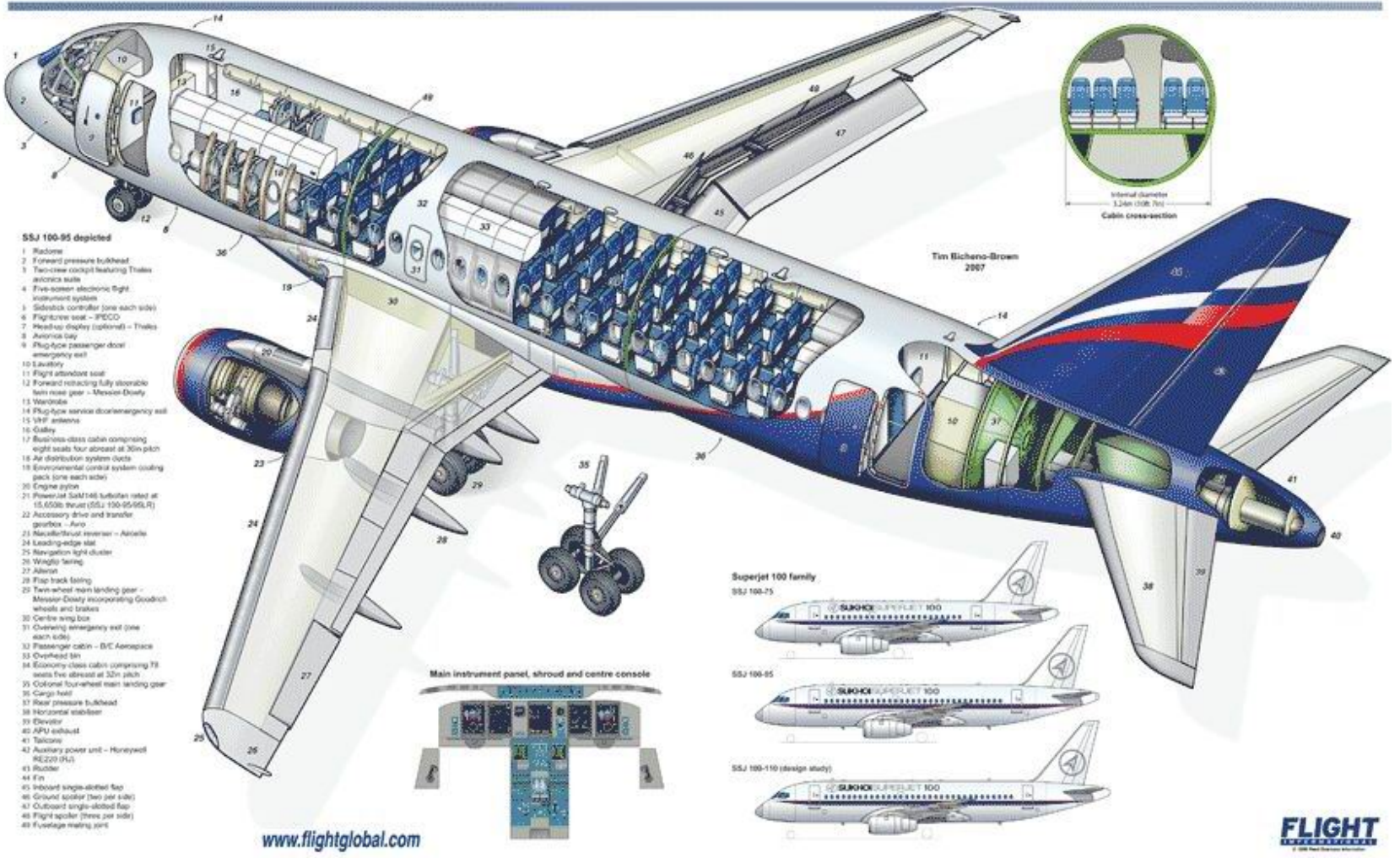
Overall length	48' 5" (14.76 m.)
Overall beam	23' (7.01 m.)

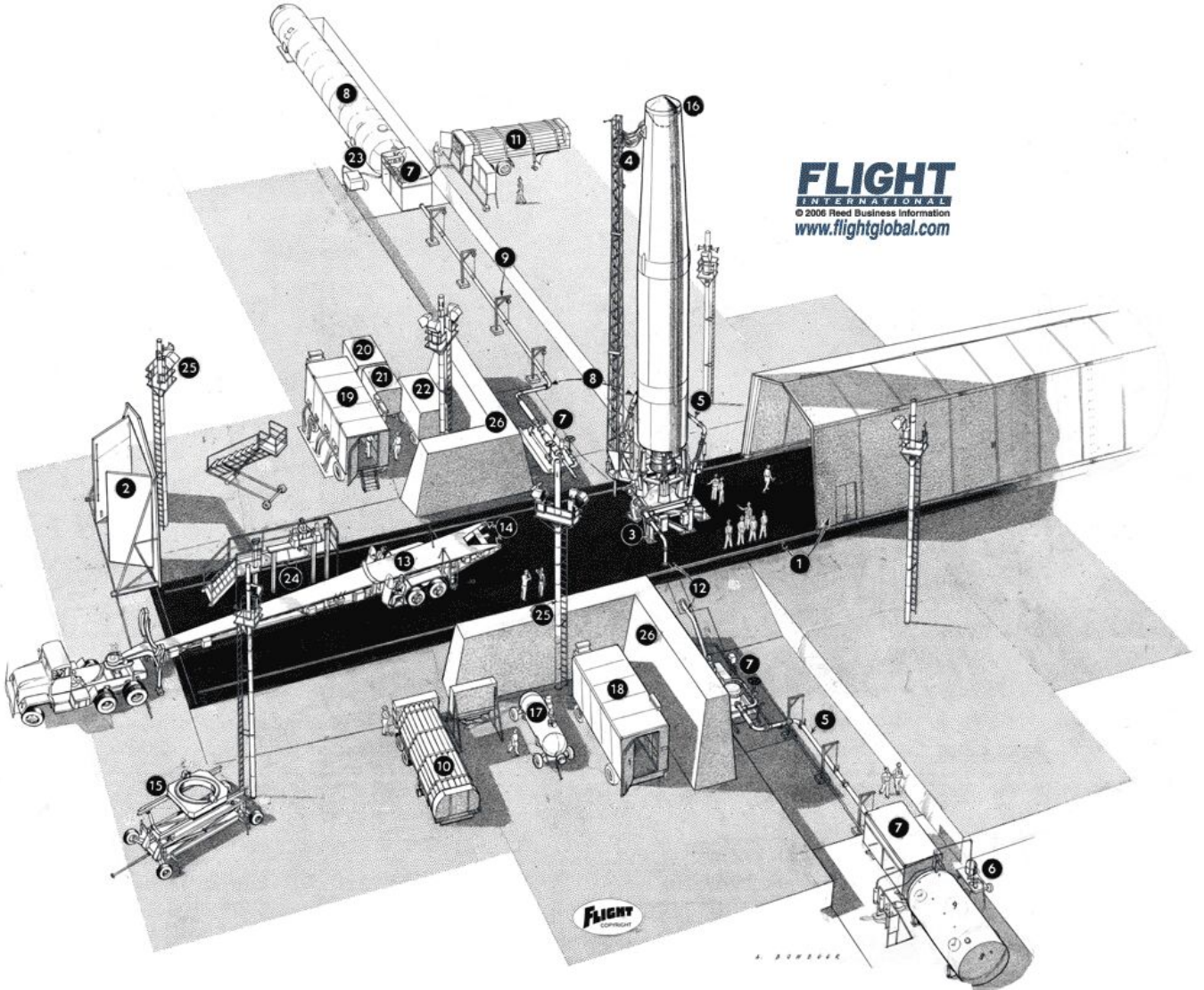
POWER PLANT AND SYSTEMS

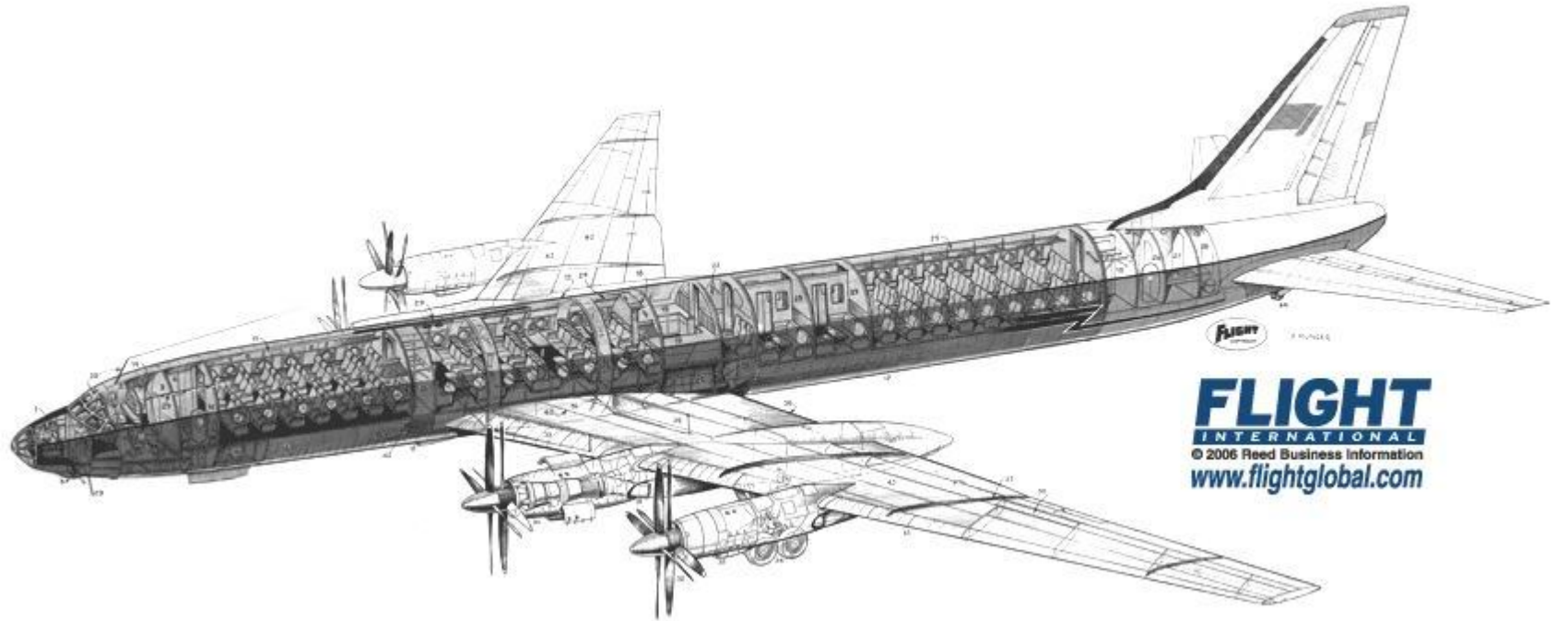
Engine	Bristol Siddeley 'Marine Gnome' 1051 900 s.h.p. max. continuous
Propeller	Dowty Rotol, 4-blade, variable pitch, 9 ft. dia. (2.74 m.)
Lift fan	BHC centrifugal 7 ft. dia. (2.13 m.)
	Max. passenger capacity



SUKHOI SUPERJET 100




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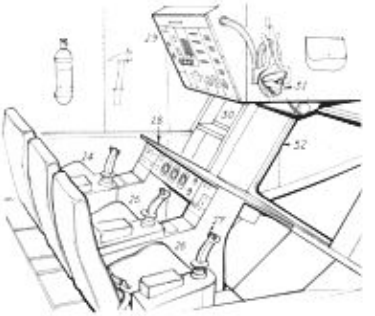


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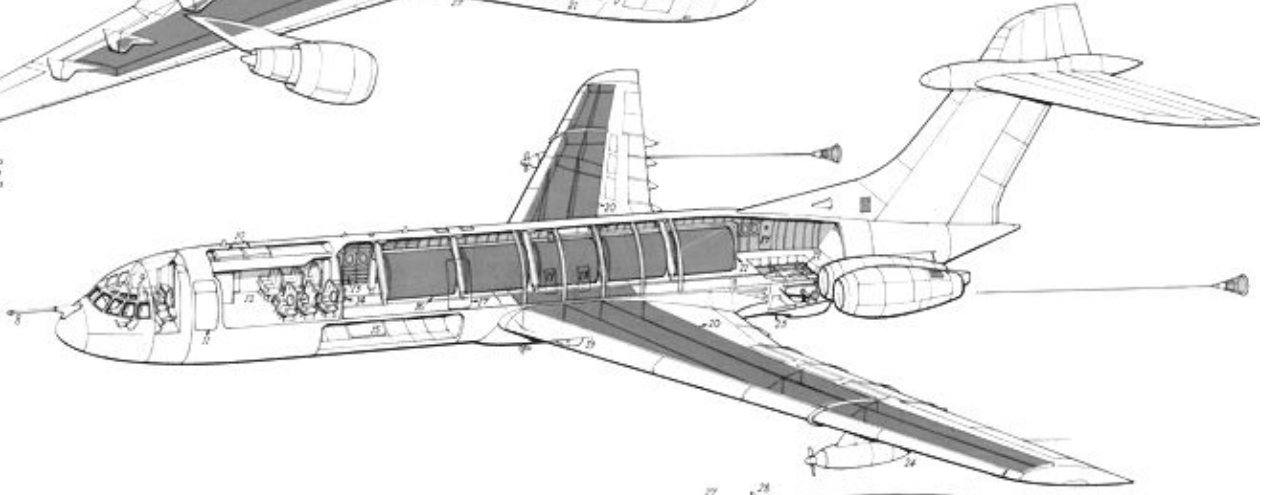
MCDONNELL DOUGLAS KC-10A

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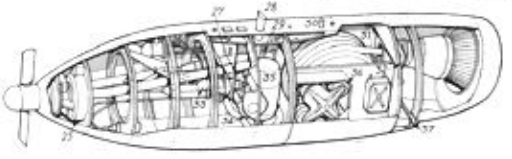




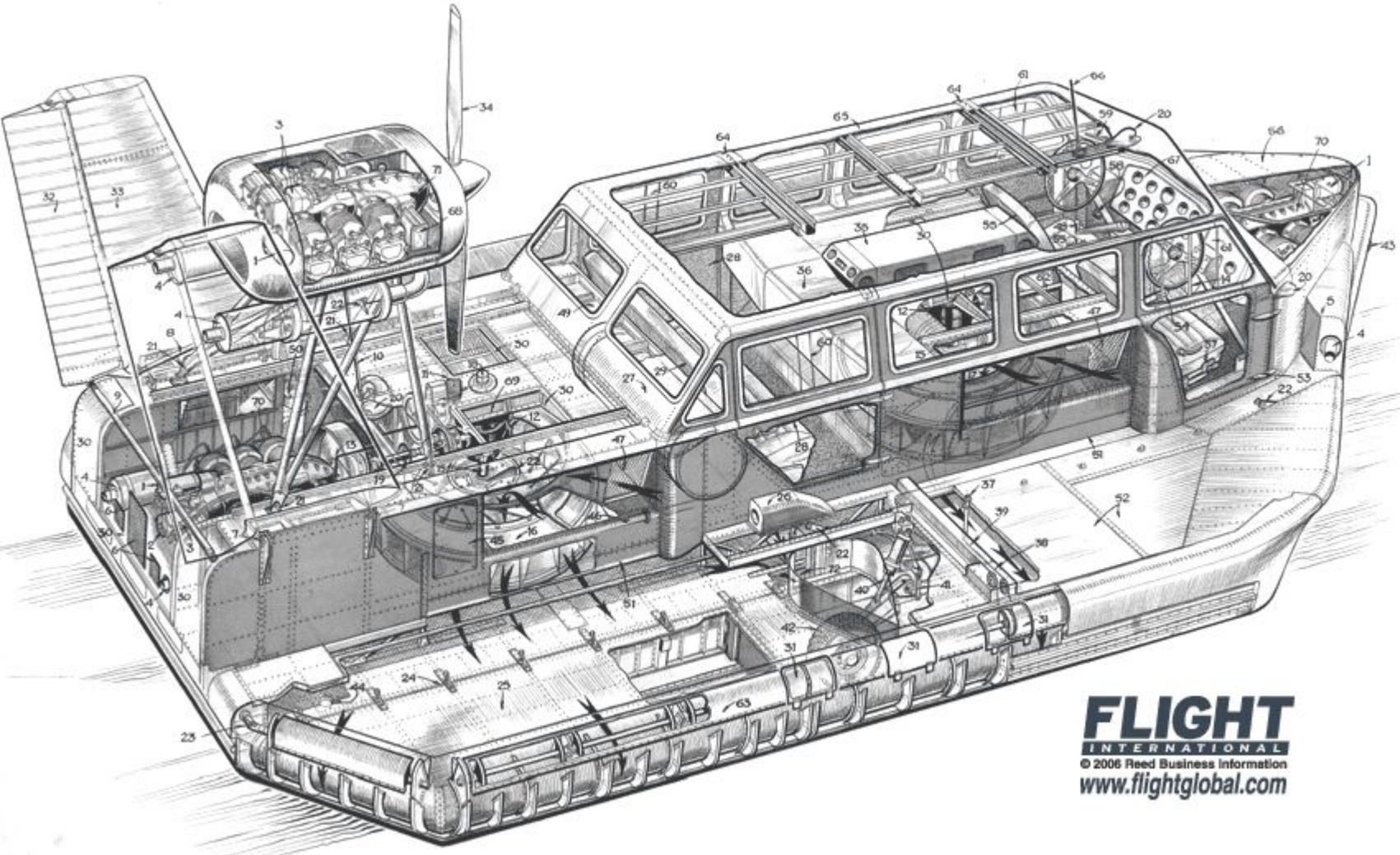
BRITISH AEROSPACE VC10 K.2



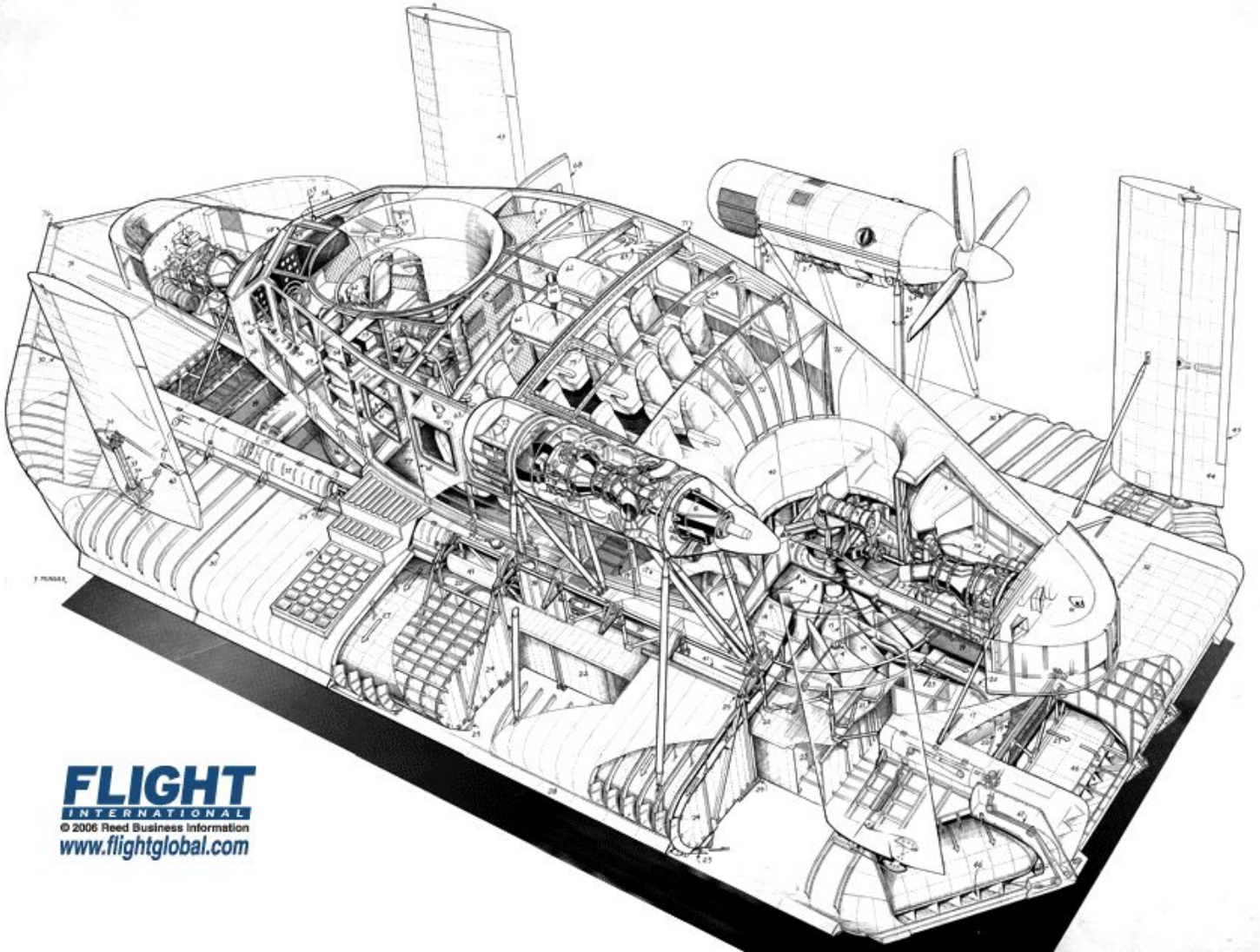




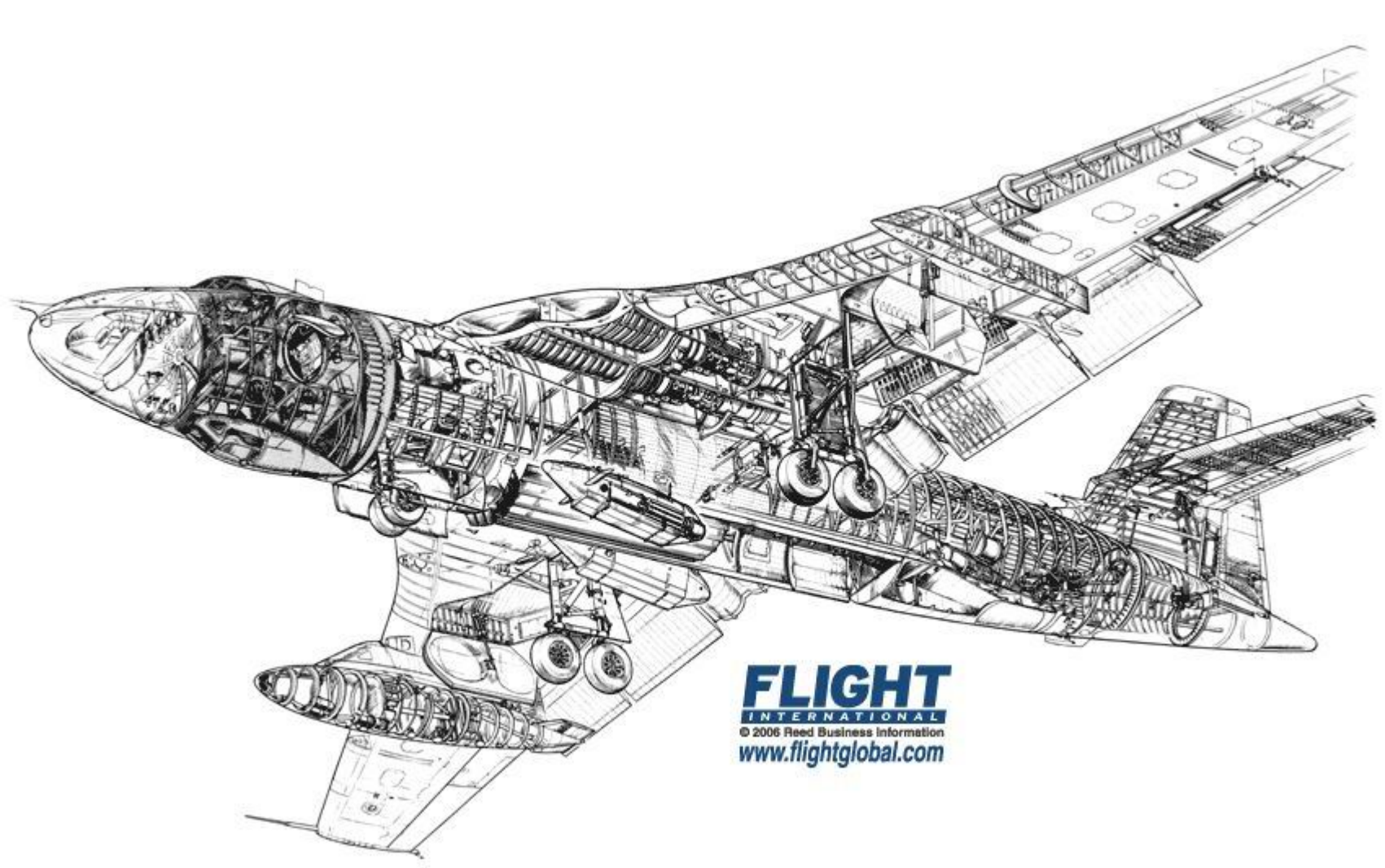
IRA EPTON



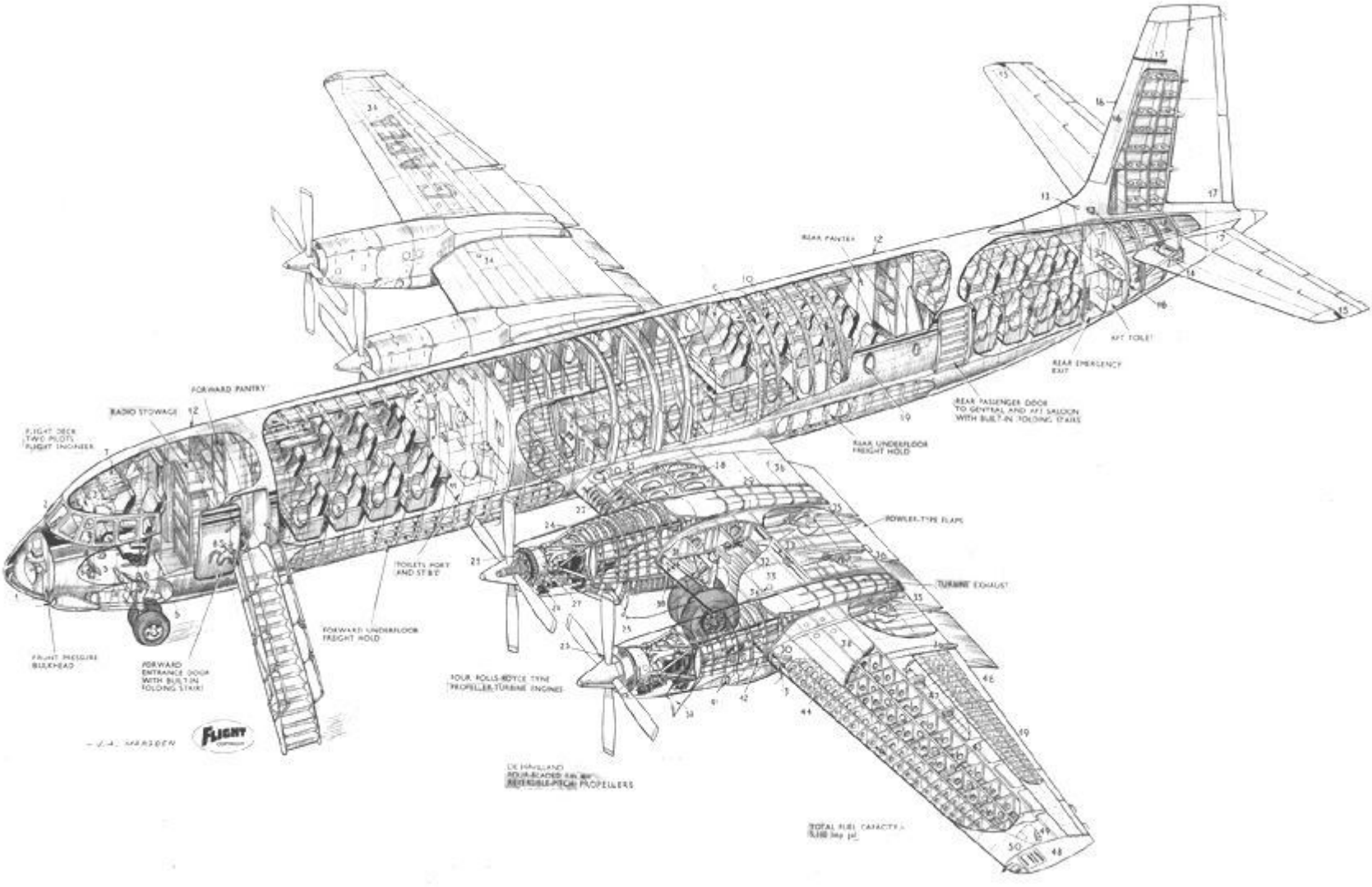
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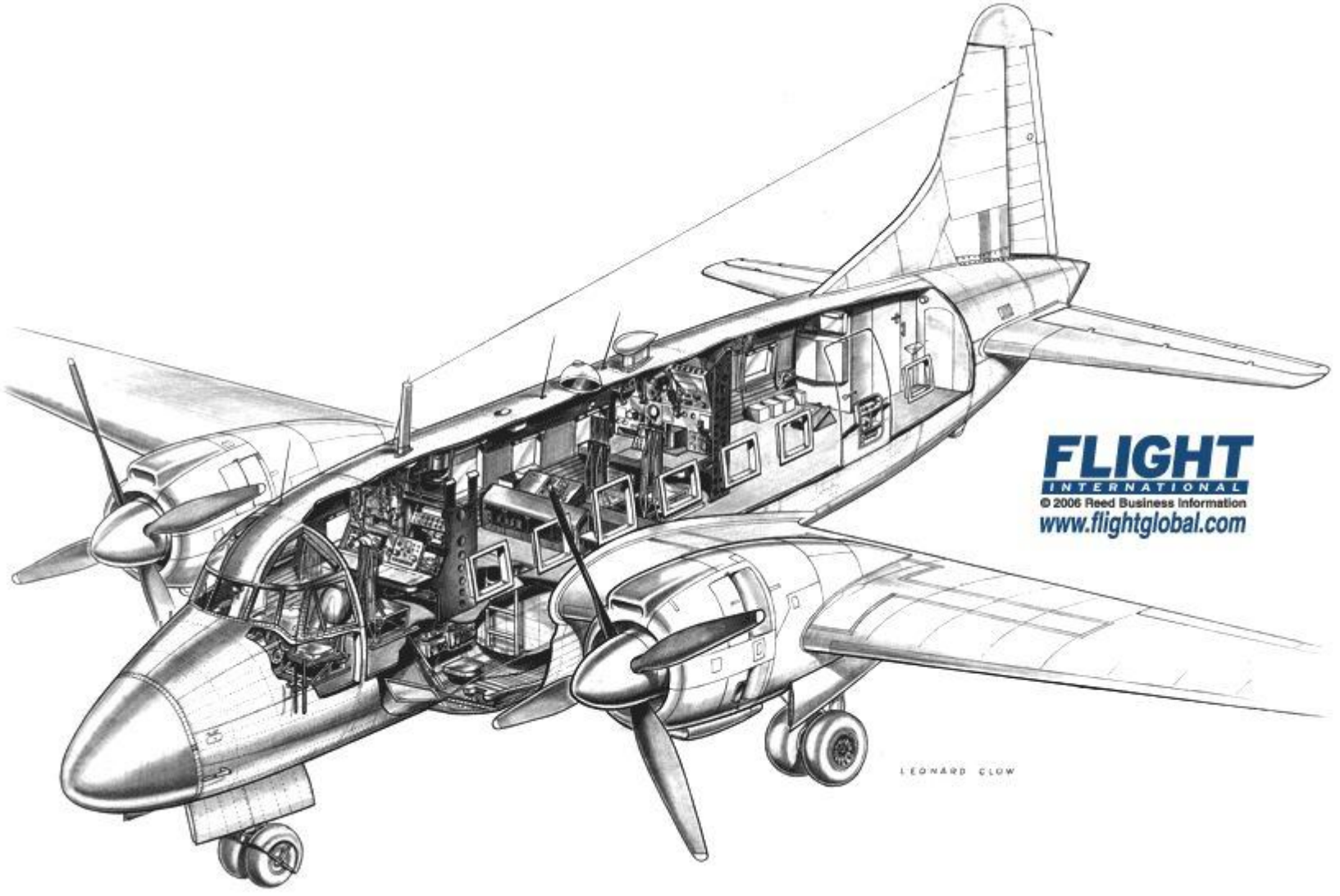


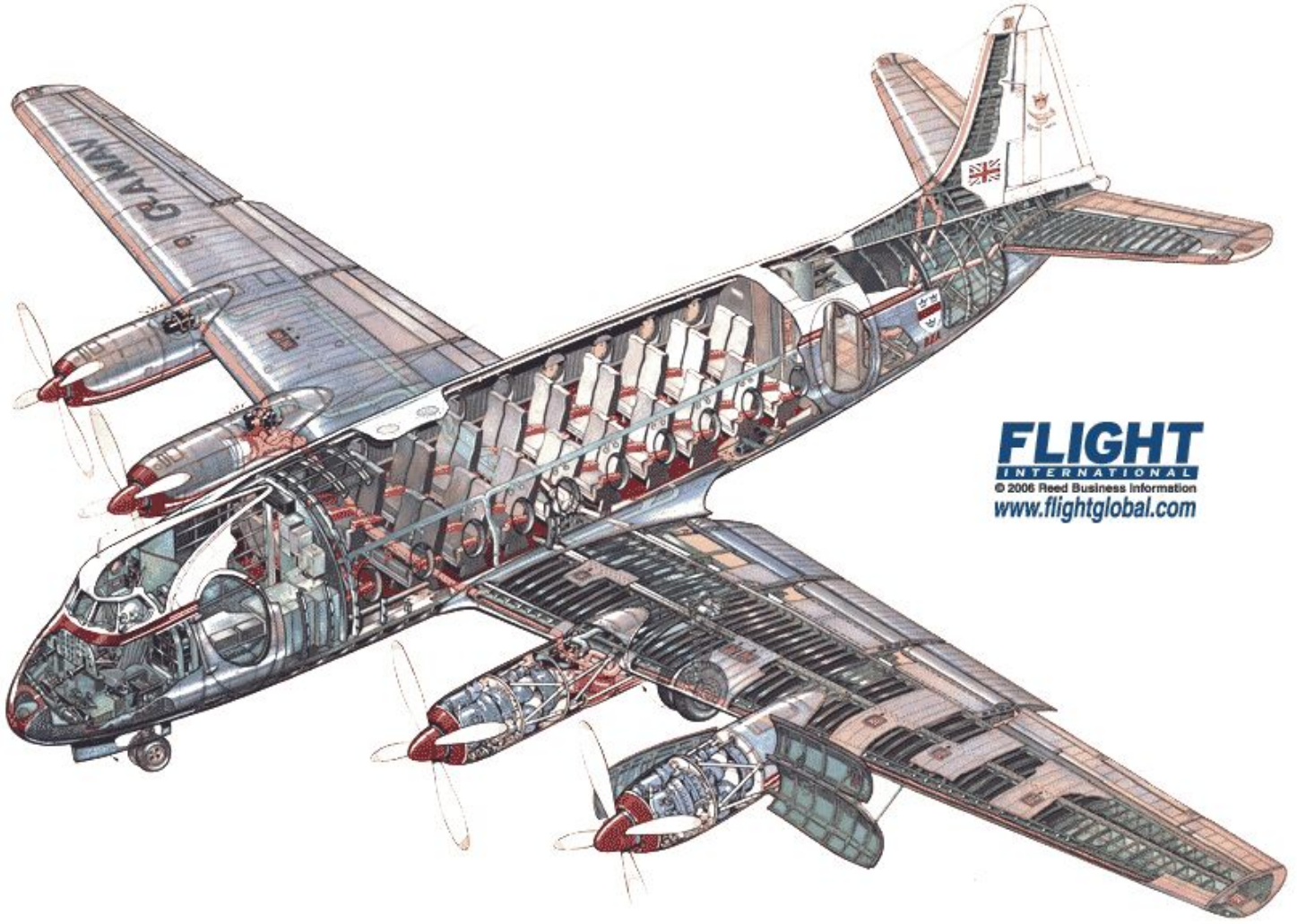
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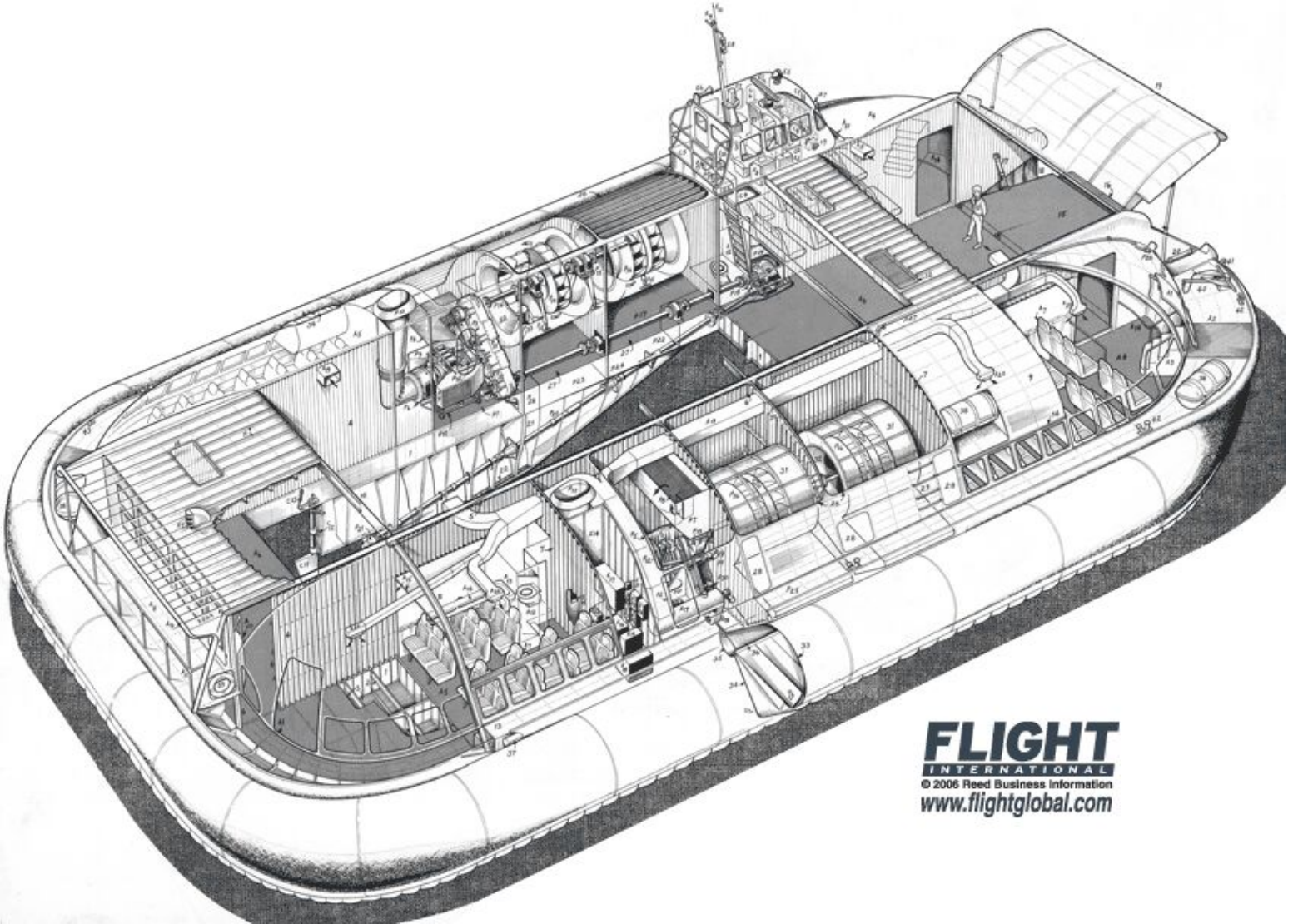


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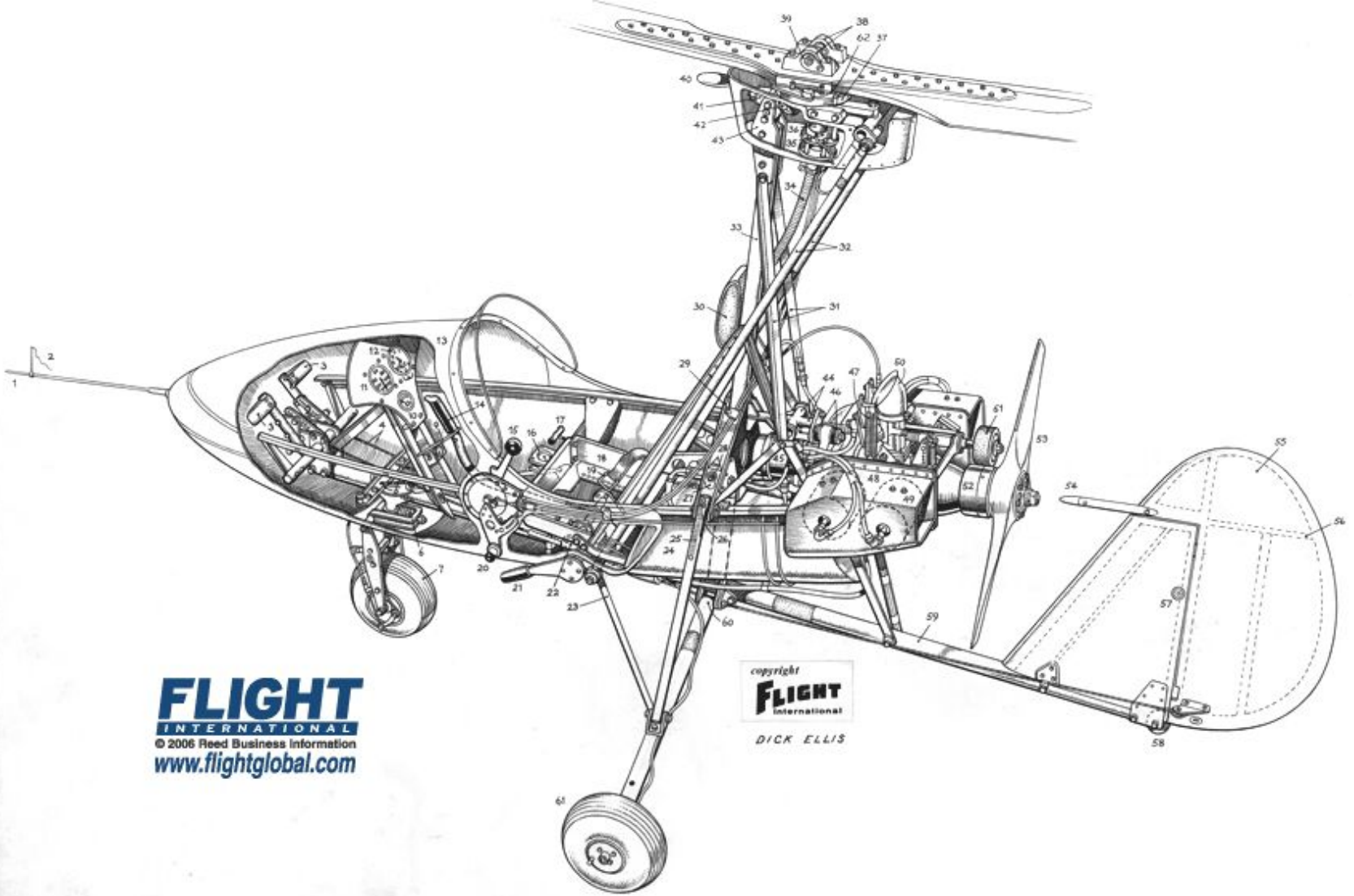

FLIGHT DECK TWO PILOTS FLIGHT ENGINEER
RADIO STOWAGE
FORWARD PANTRY
FRONT PRESSURE BULKHEAD
FORWARD ENTRANCE DOOR WITH BUILT-IN FOLDING STAIRS
TOILETS PORT AND STBD
FORWARD UNDERFLOOR FREIGHT HOLD
FOUR ROLLS-ROYCE TYNE PROPELLER-TURBINE ENGINES
REAR PANTRY
REAR UNDERFLOOR FREIGHT HOLD
REAR PASSENGER DOOR TO GENTS'AL AND AFT SALOON WITH BUILT-IN FOLDING STAIRS
AFT TOILET
REAR EMERGENCY EXIT
FOWLER-TYPE FLAPS
TURBINE EXHAUST
FLIGHT


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LEONARD CLOW

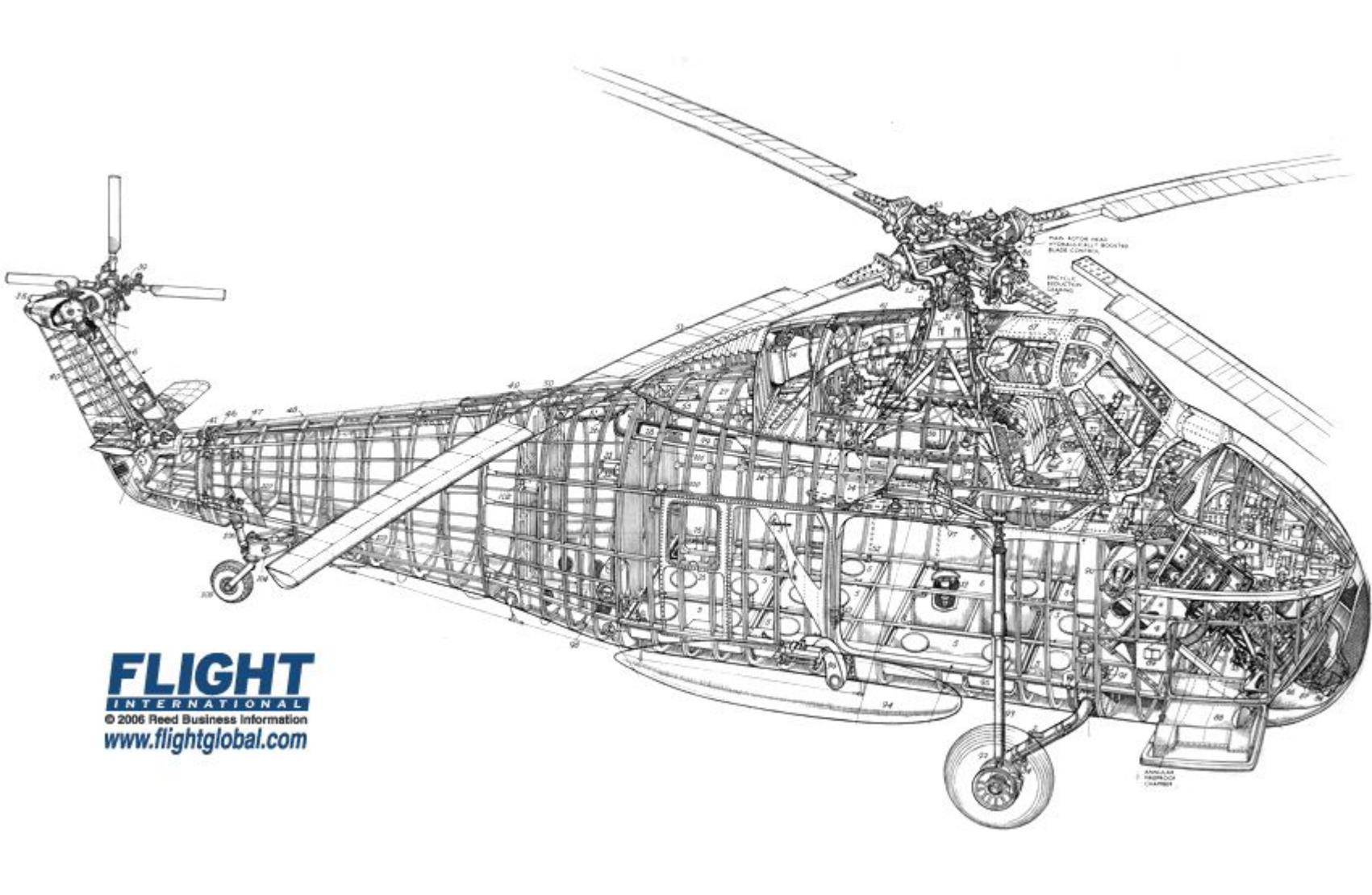

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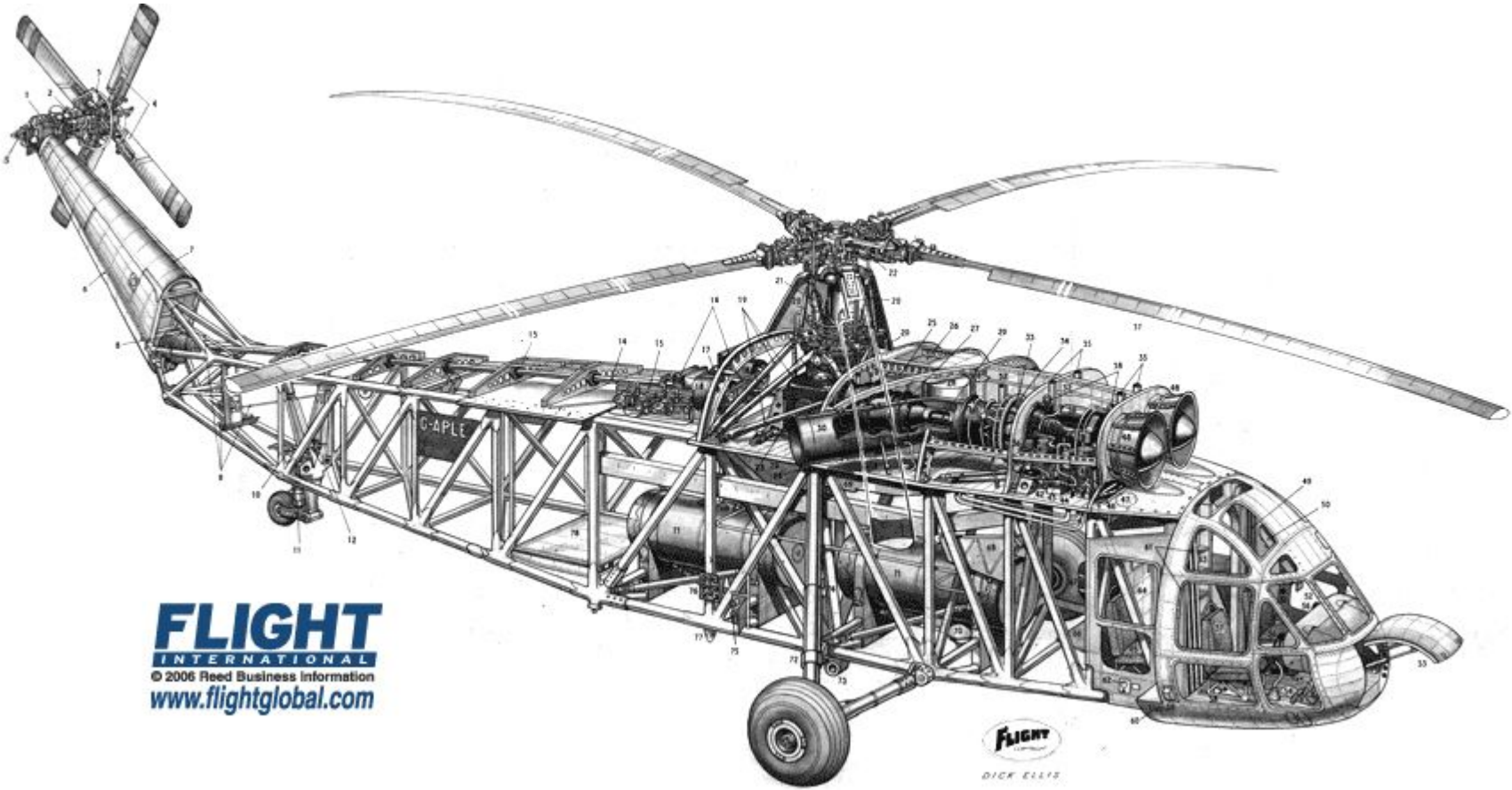
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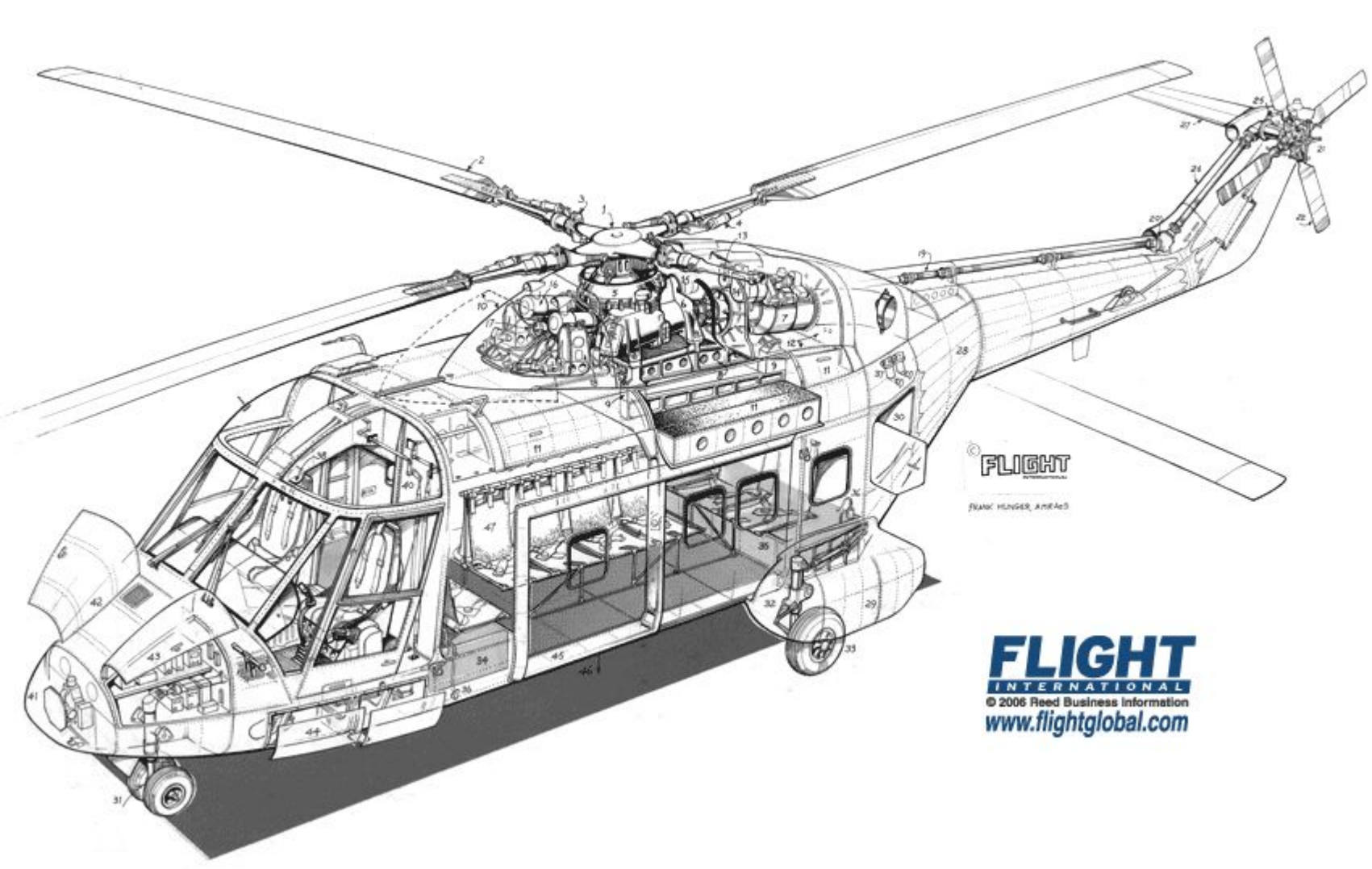
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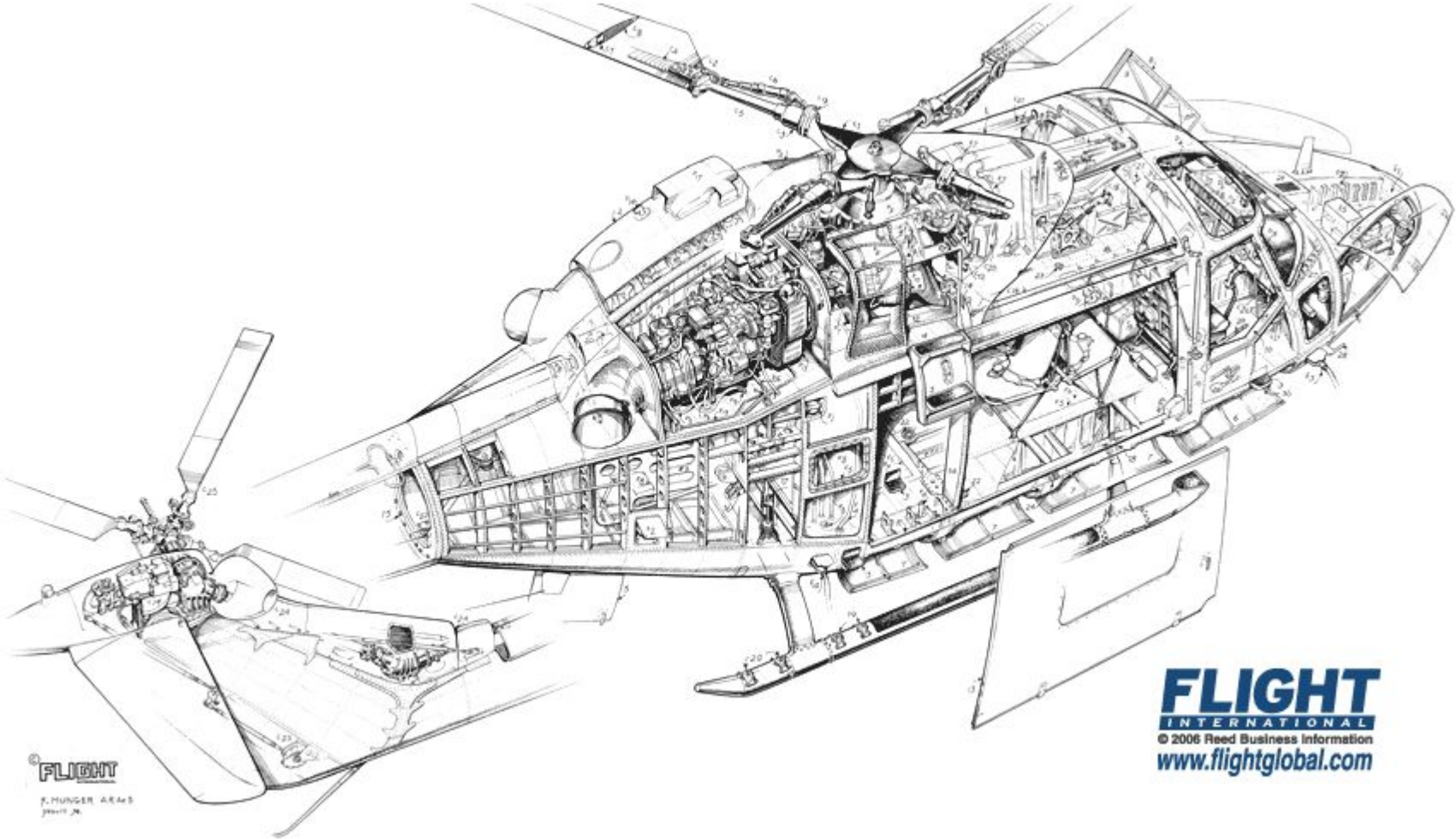


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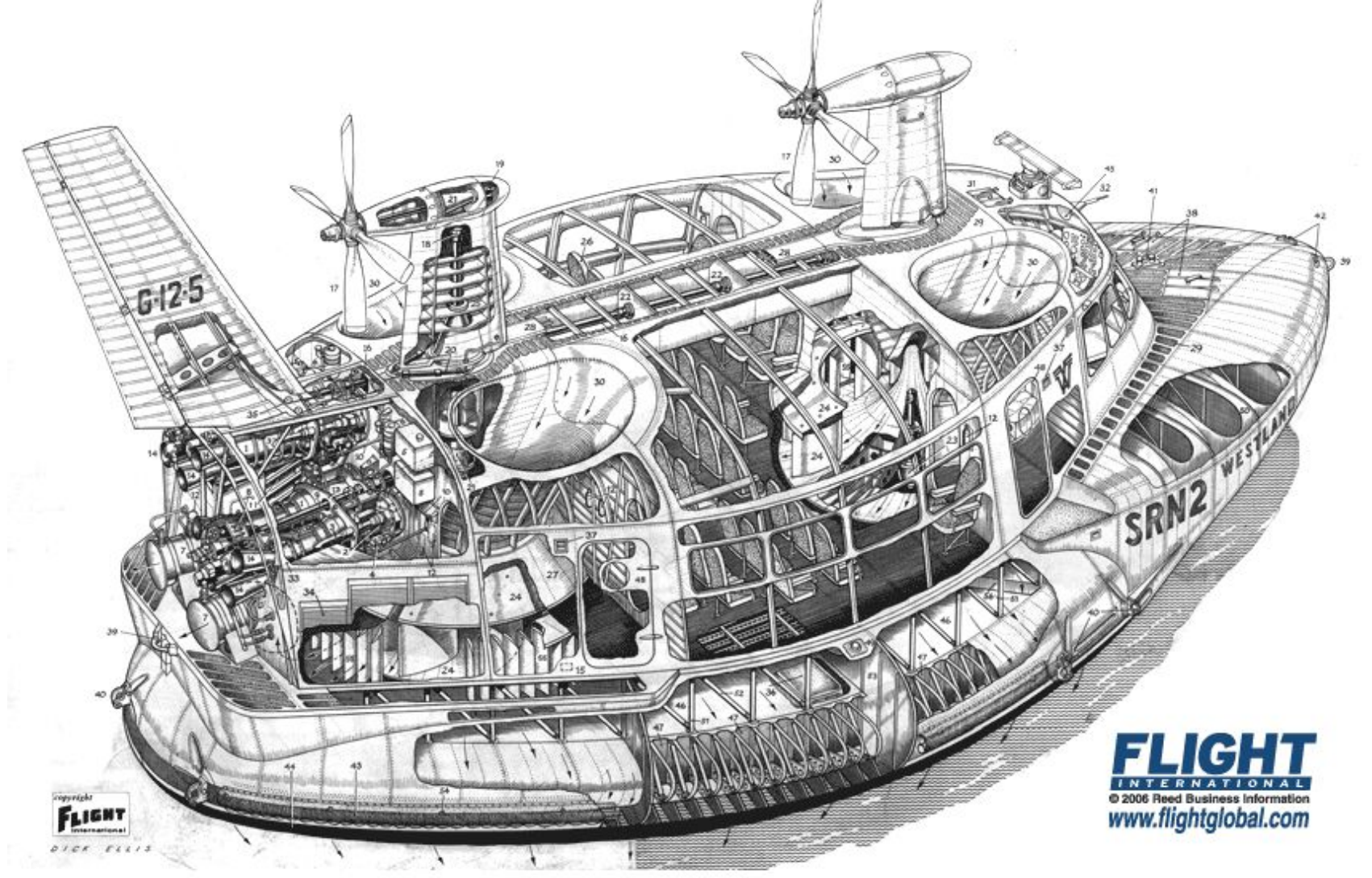


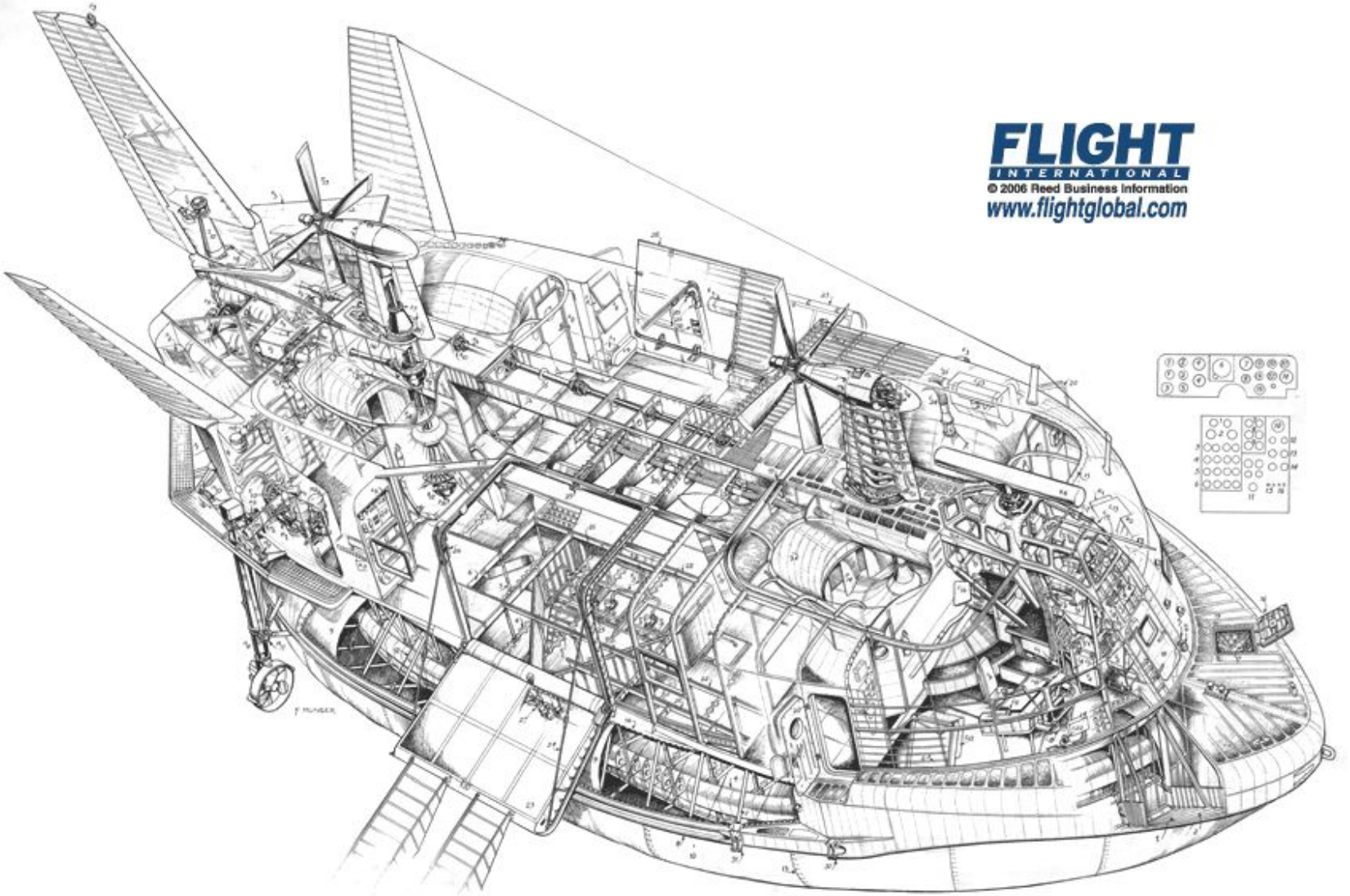
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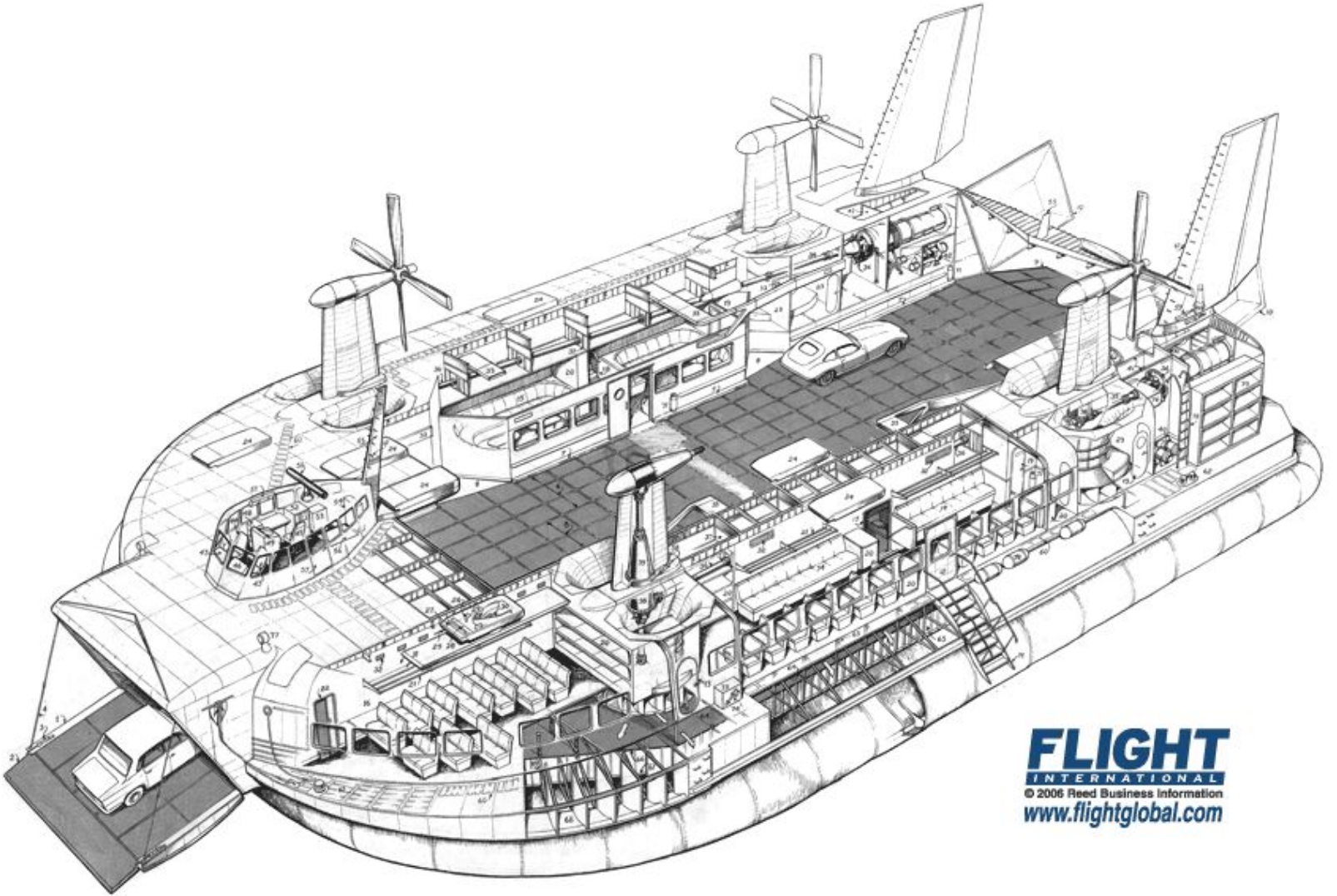

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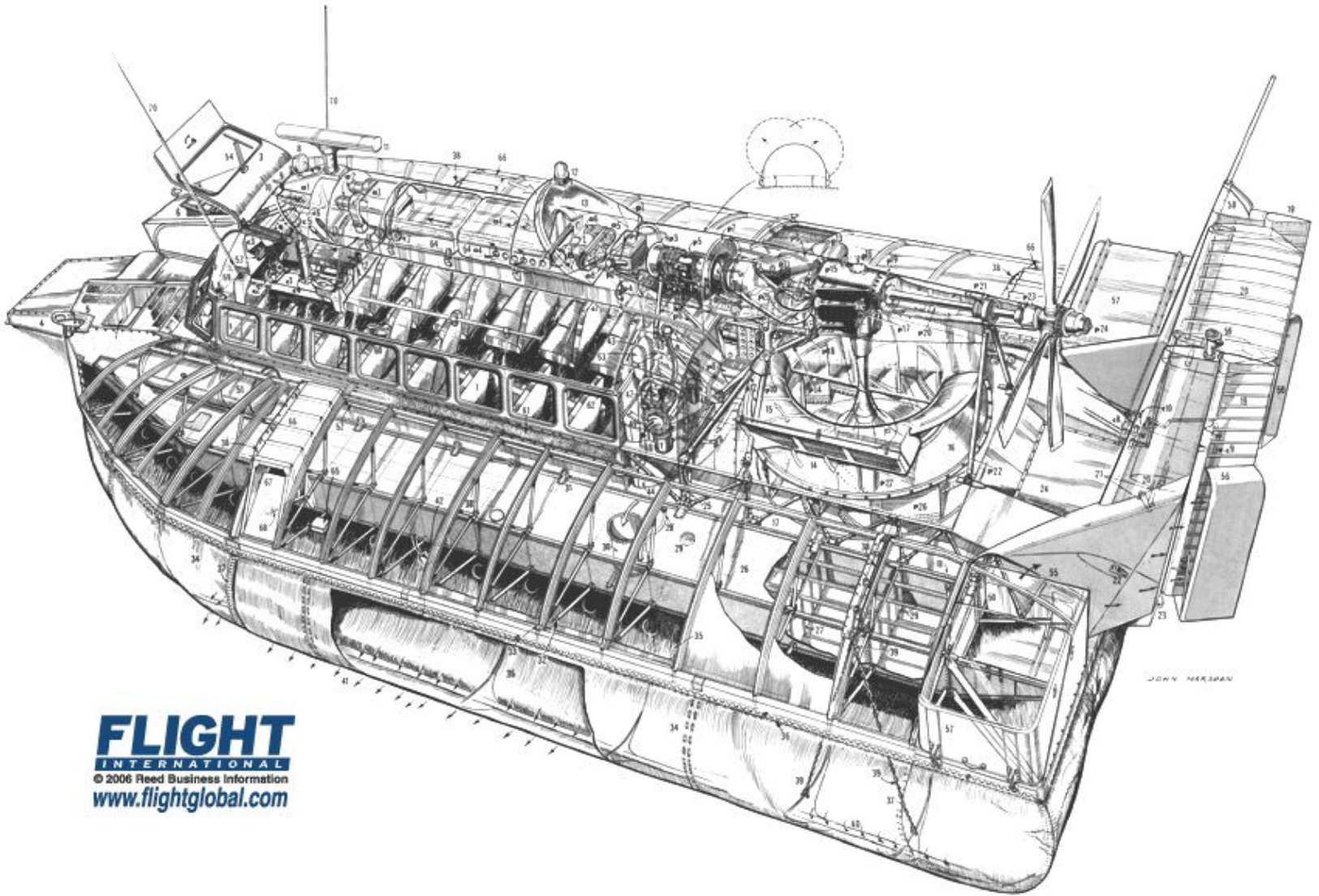
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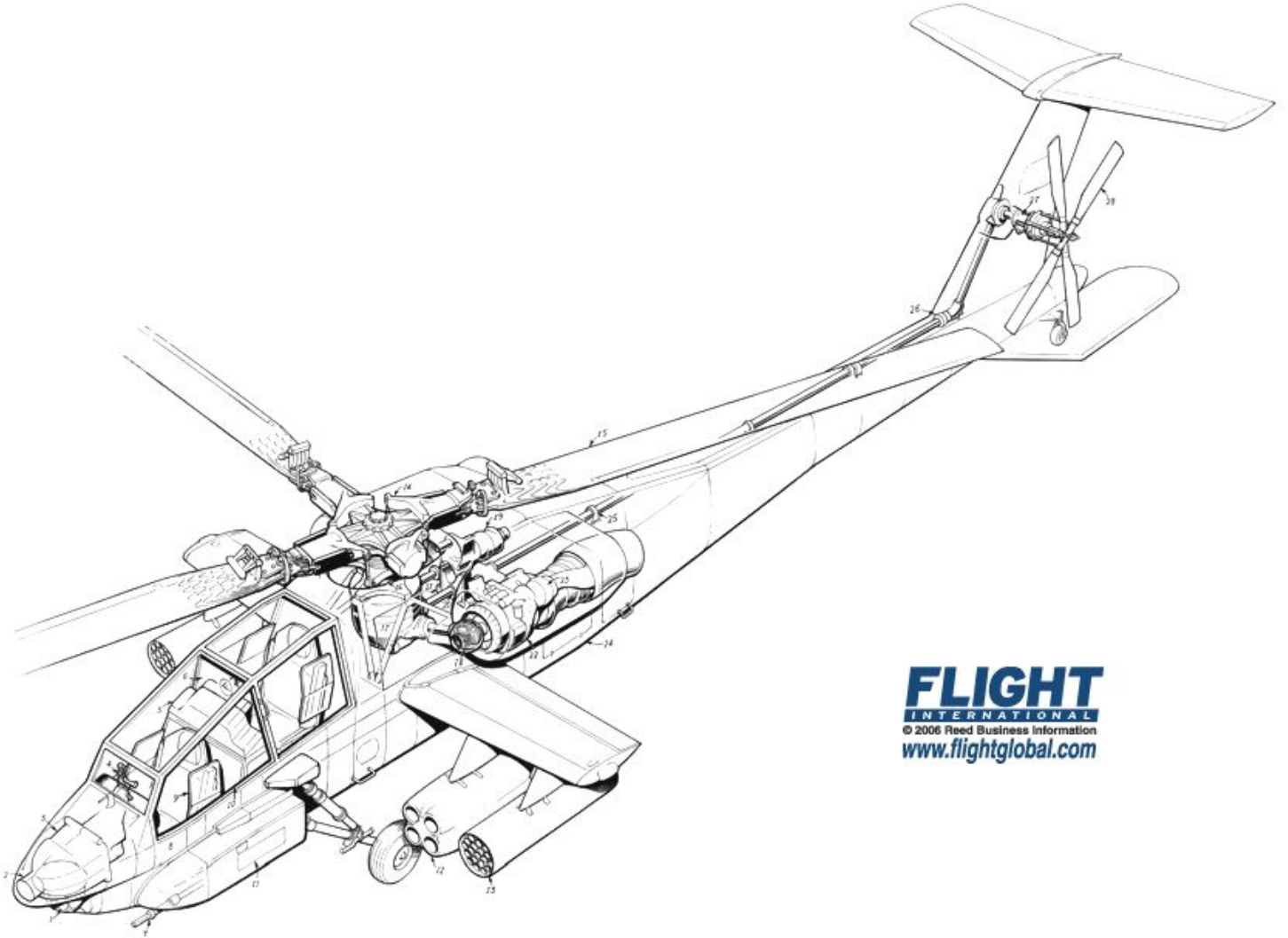

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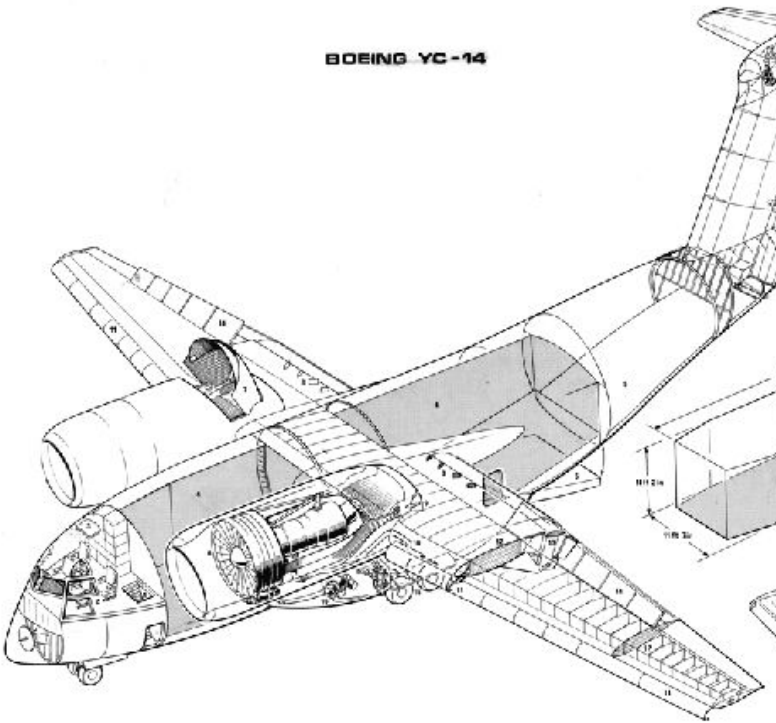


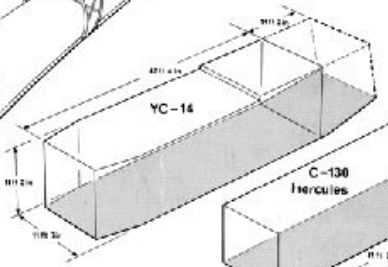
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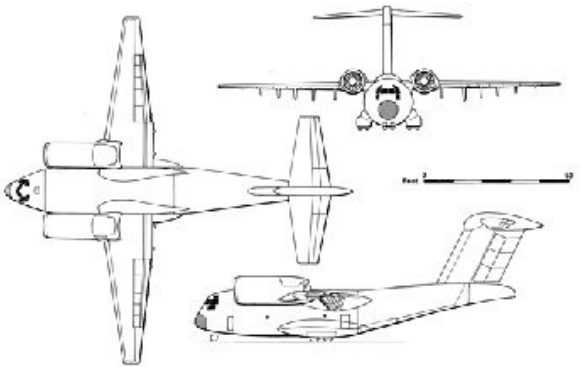

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